GROWTH OF RURAL POPULATION IN UTTAR PRADESH - A REGIONAL ANALYSIS OF FERTILITY AND MORTALITY PATTERNS

ABSTRACT

Thesis submitted for the award of the degree of

Doctor of Philosophy

in

GEOGRAPHY

by

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Under the supervision of

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ABSTRACT

Population in general sense, is defined as any finite or infinite collection of individual objects. But in the context of geography it refers specifically to a congregation of human individuals. Though geography has never been completely divorced from the consideration of population the intensive, specialized and systematically organized study by the geographers began only with the presidential address of Trewartha. Population geography's main concern is the study of spatial variations in demographic processes and patterns, i.e., growth, distribution and composition of population, in relation to environment. Clearly, any change in the size of population group, whether increase or decrease, is usually called growth. The rapid population growth together with its growing imbalances in different regions of the state causes great anxiety to the already low standard of living. The most important characteristic of population is its dynamic and consequently changing nature. The natural population growth in any region is the result of two interacting processes of fertility and mortality.

The widely pronounced 'population explosion' is one of the most significant problems that modern world faces today. The world for long has been facing varied problems, but never before in the history of mankind its number and growth based problems as now. The study of population growth is, therefore, very essential for the present and future relationship between man and land for their adjustment and equilibrium. As a dynamic factor, its increase or decrease in any area/region is the result of a combination of two forces, i.e., the differences between births and deaths and the balances of migration. The present population is only a stage in dynamic demographic evolutionary phase where in the rate of increase or decrease of population in a region greatly affects its economic and social progress. Obviously, thus, the population growth determines the standard of economic development of the area and people's standard of living as well.

Uttar Pradesh is the most populous state of India. It supports about 16.44 per cent of India's population having about 9 per cent of the area of the country. Consequently the average population density in the state works to about 471 persons per sq. km. (1991).

Uttar Pradesh extends from $23^{\circ}52'$N to $31^{\circ}28'$N latitudes and $77^{\circ}04'$E to $84^{\circ}38'$E longitudes. It lies in the central part of the northern plain of the country. Physically the state can be easily divided into three distinct regions - Himalayan zone in the north, the Ganga Plain in the middle and the plateau region in the south.

The chief objective of this work is to study the 'growth of rural population in Uttar Pradesh - a regional analysis of fertility and mortality patterns'. The attention has been mainly focused firstly on rural population growth and secondly on patterns of vital processes (fertility and mortality) in Uttar Pradesh. Former is studied in detail and its variations have been compared with the variations of urban and general growth of population in the study area. These variations are directly affected by fertility and mortality. Therefore, they are studied in detail in the present work. The present work entirely depends upon the district level published and unpublished data, reports and records.

The whole work comprises six chapters excluding introduction and conclusion. The first chapter presents the conceptual framework of population growth as well as vital processes (fertility and mortality). The second chapter is devoted to the introduction of the study area through main characteristics of the physiographic outline, demographic outline, and economy and health services of Uttar Pradesh. The third chapter highlights the methodology. It incorporates selection of the study area, techniques of analysis, selection of varialbes and advanced techniques applied. The fourth chapter i.e., population growth is discussed under the heads of trends and regional distribution. The fifth chapter embodies a thorough analysis of fertility (birth rate and child-woman ratio) mainly under the trends, distribution, regions, and relationship between fertility and demographic and non-demographic variables. In the last chapter, the mortality (death rate and infant death rate) is analysed mainly under the trends, distribution, regions, and relationship with demographic and non-demographic variables.

The whole doctoral thesis observed that, there is a declining trends of fertility and mortality. The distribution of fertility and mortality is quite dissimilar which is significantly determined by marital status, health facilities, female education and employment factors.

In the factor analysis the selected independent variables of 41 x 63 data matrix were collapsed and five new variates were identified which influence the fertility and mortality patterns in general and by residance in Uttar Pradesh. The variates socio-cultural, health facilities-cum-female education and employment, age composition and health facilities, vital processes and cultural and economic stand for total population. The variates for rural population in descending order of importance, are health facilities and rurality, marital status and cultural, socio-cultural, vital processes-cum-cultural, and educational and demographical. For urban population five variates in order of the significance, are population structure, health facilities, education and marital status, levels of female education and culture.

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TO
MY PARENTS
WHO ARE NO MORE

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INTRODUCTION

Population geography may be considered as one of the major aspects of human geography. It deals with the numbers, density and characteristics of human population in the regional perspective. The focal point of this youngest sub-field of geography is the systematic study of the spatial variations in demographic and non-demographic qualities of human populations. According to Zelinsky the scope of the field should include a treatment of all of the variables present in the census schedules of advanced nations. These data are frequently used in various disciplines of knowledge but the geographic use of the data is unique for its being centred on the identification of regional patterns and spatial arrangements. This identification provides the base for the investigations and explanations of the process of the formation of regional patterns and personalities.

For a population geographer, however, the phenomenon of population growth has a special significance. He values it as a vital index of a region's economic development, social awaking, historical and cultural background and political ideology. Population growth is, thus, pivotal to the region's demographic dynamism. It is the attribute with which all other characteristics of population are intimately related and from which they derive their significance. Thus, the understanding of population growth in an area holds the key to the understanding of demographic structure of the area in general and vital processes in particular.

The widely pronounced 'population explosion' is one of the most significant problems that modern world faces today. The world for long has been facing varied problems, but never before in the history of mankind its number and growth based problems as now. The study of population growth is, therefore, very essential for the present and future relationship between man and land for their adjustment and equilibrium. As a dynamic factor, its increase or decrease in any area/region is the result of a combination of two forces, i.e., the difference between births and deaths and the balance of migration. The present population is only a stage in dynamic demographic evolutionary phase wherein the rate of increase or decrease of population in a region greatly affects its economic and social progress. Obviously, thus the population growth determines the standard of economic development of the area and people's standard of living as well.

With the emergence in recent decades of new demographic trends in the developing countries, the need for a better understanding of the impact of demographic factors on socio-economic development has become a matter of prime concern. The prospective increase in population should be of major concern to planners for two reasons. First, it will have profound resource, environmental, and economic consequences, that will determine how much or little progress can be made in terms of improving the standard of living. Second, these consequences will in tern affect a number of important demographic variables. The very high growth of population have led to various socio-economic problems such as hunger and malnutrition, poverty and lower living standard, lower availability of natural resources, degradation in natural environment, scarcity of comfortable and hygienic houses, unemployment, overcrowding in schools, hospitals and various other social amenities. On the other hand, the present socio-economic backwardness is the result of higher growth of population in these areas. The under-developed regions are characterized with the high and stationary birth rate, low and declining death rate, accelerating rate of population growth, widespread poverty and lower level of living standard. It highlights, that the growth of population of the any area depends entirely on human fertility. Any society replenishes itself through the process of human fertility. Thus in population dynamics, fertility is a positive force, through which the population expands, counteracting the force of attrition caused by mortality. If the replacement of human numbers is not adequate - that is, if the number of deaths in a particular society continues to be more than that of births, that society would face the danger of becoming extinct. On the other hand, excessive replacement of human numbers can also create several social and political problems for a country.

Mortality is the second major component of growth of population. Historically, the factor of mortality has played a dominant role in determining the growth of population, the size of which fluctuated in the past mainly in response to variations in mortality. The increase in the population of European countries following the Industrial Revolution in the seventeenth century was mainly due to a decline in the death rates. The developing countries, which are undergoing a typical demographic transition, have also been affected initially by the fall in the death rates. In fact, the single most important contribution of demography has been the revelation of the fact that sharp declines in mortality rates, rather than any rise in the fertility rates, have been responsible for bringing about a rapid growth of population.

The principal objective of the study is to analyse the growth of rural population in Uttar Pradesh - a regional analysis of fertility and mortality patterns. The attention has been mainly focused firstly on rural population growth and secondly on patterns of vital processes (fertility and (mortality) in Uttar Pradesh. Former one is studied in detail and its variations have been compared with the urban and general growth of population in the study area of Uttar Pradesh, which is one of the largest states of India. These variations are directly affected by fertility and mortality. Therefore, they are attempted to study in detail in the present work.

Present work is entirely based on district level published and unpublished data obtained from Census of India and Vital Statistics of India, New Delhi, Directorate of Medical Health and Family Welfare, Medical and Health Services and Economics and Statistics Division, State Planning Institute, Uttar Pradesh, Lucknow.

The present doctoral research on **'Growth of Rural Population in Uttar Pradesh - A Regional Analysis of Fertility and Mortality Patterns'** is organized into six chapters excluding introduction and conclusion. The **first chapter** is conceptual framework. In this chapter concepts, measurements and determinants of population growth, fertility and mortality are discussed. The **second chapter** introduces the study area. In this chapter the physio-graphic outline, demographic outline and economy and health services have been described.

The **third chapter** highlights the methodololgy. It incorporates selection of the study area, techniques of analysis, selection of variables and advanced techniques applied.

The **fourth chapter,** population growth in Uttar Pradesh with reference to trends and regional distribution. The **fifth chapter** embodies a thorough analysis of fertility (birth rate and child-woman ratio) mainly under the trends, distribution, regions, and relationship between fertility and demographic and non-demographic variables. In the last chapter, i.e., **sixth,** the mortality (death rate and infant death rate) is analysed in detail mainly under the trends, distribution, regions, and relationship between mortality and demographic and non-demographic variables.

CHAPTER I

CONCEPTUAL FRAMEWORK

POPULATION GROWTH

The term, 'Population Growth' or 'Population Change' is used in its broadest connotation to cover changes in population numbers, inhabitants of a territory during a specific period of time, irrespective the fact, whether the change is positive or negative.[01] Though the growth signifies both an increase and decrease, therefore, stands for change of numbers, nevertheless the choice of growth over change is mainly due to the fact that very few countries of the world have recorded a decline in their population and that too has been marginal and for short period. On the contrary, in most of the countries populations are going so rapidly that world population growth has become one of the major problems of the present.

The most important fact about a population is the continuous process of change of its numbers. This process of change results basically from fertility and mortality behaviour of a population. In addition to these vital process, the in-migration and the out-migration on the one hand and the mortality and out-migration on the other provides a measure of change, irrespective of its being an increase or decrease of number is referred to as population growth. Demographers use the term 'growth' in the sense of change single demographic fact about a population is its rate of growth.[02]

Population growth can be measured both in terms of absolute numbers and percentage. The absolute growth is obtained by subtracting the population of an earlier date from that of later date, while the percentage change is obtained by dividing the absolute change by the population of the earlier date and multiplying it with 100. Population geographers have often calculated the per cent growth of population for a period of ten years. This period normally synchronises with the inter-censal periods. Such a growth rate is calculated with the help of actual population count at the earlier census and the generally known as actual rate of population growth.

Apart from the absolute increase and the actual growth rate of population per annum, one of the most common measures is the geometric or annual rate of increase. The rate of geometric growth is one in which the population is supposed to increase or decrease at the same rate over such unit of time, say each year. The geometric rate of increase is the type of change where the compounding takes place at a certain constant interval say a year. It is a useful rate and may be helpful in assessing the accuracy of vital and migration statistics. Various techniques have been adopted for measuring the annual growth rate of population. The results obtained vary from measure as the variable taken and methods adopted are not always the same in all the cases. However, the method adopted by the U.N. Demographic Year Books have been commonly used for computing the annual growth rate of population.

Determinants of Population Growth

Population growth varies from nations to nations and among different sections of a nation. These variations are caused by several factors directly or indirectly. Some of the selected determinants are demographic, economic, social, political and technological.

Demographic Determinants

It is one of the chief determinants of population growth. It influences through fertility, mortality and migration levels. Fertility and mortality are more important than the migration. They determine the number of people for the earth as a whole. The rate of growth is primarily determined by the relation between birth and death rates. Migration also affects growth, but in respect or regional variations and open populations otherwise it is ineffective as determinant of growth of population.

Fertility as an important determinant of population growth, does not concern only to women themselves but also that community to which they belonged.

Fertility ~~had~~ has a direct bearing on the growth, size and structure of a population. The growth of the population depends mainly on fertility. In population dynamics fertility is the positive force, through which the population expands, counteracting the forces of attrition caused by mortality. If this replacement of human beings is not adequate, i.e., if the number of deaths in particular society continues to be more than that of births, the society would ~~force~~ face the danger of becoming extinct. Apart from the immediate affects of fertility on the size and growth of population, fertility ~~upsets~~ the age structure of population which in ~~the~~ turn ~~has long term~~ affects the growth of population. Because it is the fertility rate that determines the proportion of population in different age groups. A high fertility includes an age structure which is highly weighted towards the younger ages.

Most of the developing countries at present have a completed family size of 5-6 children. If this rate of fertility continues in coming generations, it means an infant boy and girl who will go on to have 6 children is to add these people plus their 36 children, 216 great grand children and so on.[03]

Historically, the mortality had played a dominant role in determining the growth of population, the size of which fluctuated in the past mainly in response to variations in mortality. The increase in the population of European countries following the industrial revolution in the seventeenth century was mainly due to a decline in the death rates. The developing countries, which are undergoing a typical demographic transition have also been affected initially by the falls in the death rates. In India, too the most important factor that has contributed to a very high growth rate of population during last four decades has been the sudden and phenomenal fall in death rate and before independence it was the high mortality rate which kept the population check. It is indeed, the declining mortality rather than any rise in fertility which is responsible for the much feared 'population explosion'.

Migration is the third dynamic constituent of population growth. A population may gain in size by experiencing an influx of migration and it may diminish in size by an exodus of some or its members to join another population. Both international and internal migration have played a very important role in the history of population growth of any country.[04]

Differences in the natural increase among the status of a country are often rather very small, while in reality there are wide variations in their growth rates. The only principal machanism for such wide variations in internal migration.[05] The rural to urban migration is usually associated with industrialization and urbanization. Migra~~tion~~nts from the rural areas tend to adopt the urban way of life, which in turn has a direct impact on reducing the fertility. A~~n~~ striking features of the migration is that while changes caused by the fertility and mortality in the size and structure of the population are never drastic migration may change the size, structure and sex ratio of the population quite drastically at any point of times. Regional growth rates results from both differential natural increase and migration increase leading to growth of population.

Economic Determinants

Economic factors stand~~s~~ second ~~to have the~~ potential for affecting population growth. It might be assumed that economic hard times would cause people to migrate in search of jobs and thus increase migration. However, since the rate of migration actually declines during difficult economic times, one could speculate that there is reluctance to leave familier places and conditions and take a chance on the uncertainties of some new places.[06]

The time-honoured adage that population grows in response to the demand for labour has the characteristics of an over worked half-truth, it is ~~sample~~ eminently reasonable, yet presents only one side of the problems. Certainly the massive demands for labour by the expanding American economy in the nineteenth century did lead to emigration from the old world just as the industrial revolution in Britain created the opportunity for rural-urban migration but there can be population growth without there being a demand for labour, while labour shortages can be chronic without inducing population growth.[07]

The economic factors also influences population growth through the standard of living. The inverse relationship between improving living standards and mortality has often been observed, particularly as it works through better diet, clothing and housing to am~~o~~eliorate the worst excesses of those diseases which stem from undernourishment and poverty.[08] In advanced countries the progress towards ever higher standards of living and wages was self perpetuating and that, it could be stopped only by 'perversion of the system' through monopoly was bad government or class struggle.[09] Fundamental changes in the economic development

turing and tertiary

states of development put strains on the structure of population an aspect of population growth as it adjusts from rural to urban and from man~~p~~ual to cerebral style of life and modes of employment. In nineteenth centuries it was fully observed that the increase of food supply regulated the growth of population.[10]

Social Determinants

The social class factor is most important in accounting for differential population growth. Mortality, fertility and migration patterns are all empirically related to differences in class.[11] The pure social factor can be thought of as expressing a large variety of factors - the culture, religious, linguistic, ethnic and racial characteristics of a population growth which can all be important in giving it a distinctive demographic structure. Such attributes are often used as signs of inferiority or superiority and are thus potential means of self or imposed isolation, which can itself have a variety of demographic and spatial expressions. The oppression involved has also established demographic distinctions between minority and majority. The relative standing of woman, the form of marriage pattern, the organization of family groups, whether nuclear or extended, together with the inheritance laws are all ways in which social roles are formed and norms are established. These roles and norms can mean~~s~~ the difference between, on the one hand, a society having monogamous marriages that are contracted when bride and groom are in their late twenties or thirties, where nuclear families are formed which use primogeniture as the rule for the transfer of property, on the other, society with early marriage, extended families and partible inheritance. The fertility of females in the first mentioned society is likely to be lower than that of those in the second, although which of the contributing variables in the most important increasing the tendency remains to be seen.[12]

Political Determinants

The explosive growth of world's population, with its consequent demand for more foodstuffs, keeps the world in a state of potential crisis. The Green Revolution in different parts of the world, which brought out more productive cereals like the 'miracle-rice' in Philippines and Sri Lanka and 'wheat' in Mexico, India, Pakistan let the populationist score a point only temporalily over the pragmatism of the conservationists who consider stablized population as an issue of great priority. Japan which achieved a precipitious decline in its birth rate~~s~~ mainly through abortions, still remains the prime example of the East to have contained the crisis successfully.[13]

Ironically, the population control measures in the recent part have not been very effective in the large sized less developed countries like India, China, Indonesia, Pakistan, Bangladesh where the crisis is felt most strongly. In such countries the problems are several : the numbers are great, the annual increment is substantial, the masses are illiterate and the majority of population continues to struggle to wrest a meagre harvest from landholding with the slowly improving farm technology. Under the circumstances the measure of greater productivity still appears to lie in more manpower, and that inhibits the acceptance of the concept of small families. In such societies, not only the realization about the need for birth control measures is meagre but also the dissemination of the required information and devices to control births is slow and difficult.[14]

It is also an expression of an assortment of variables which are concerned with resulting population growth. The distinctive government policies enacted in the nation are bound to influence the size and structure of the population. The effect of political factors are not, of course, limited to child-bearing. Immigration and migration laws and policies can have a significant impact on the movement of people from country to country and place to place (Chemical wastes, tobacco alcohol, drugs and so forth) can have the effect of decreasing death rates.[15]

Technological Determinants

The technological determinants can be thought of as comprising four aspects - inventions, practical development, adoption and mass use - which are, to varying degree, responses to stimulation from the other determinants. Advances in medical, transport, agricultural and industrial technological have all contributed to rapid population growth.

Medical advances in the field of oral contraception technology have meant that birth control can now be practised effectively by the many millions of women who wish to space out their children's births and limit their completed family size. However these developments have not been always whole beneficial. The ever widening gap between the technological advanced western states and those in the Third World means that health services are differentially distributed and there are wide disparities in living standards both having important implications for long-term rapid population growth.

FERTILITY

Fertility may be defined as the reproductive performance measured by actual number of births of an individual, a couple or a group of population. Fertility must not be confused with fecundity which may normally be defined as the physiological capacity of a man, woman or couple to reproduce live births. Fertility is a statistical concept with social relevance, whereas fecundity is a biological concept.

Fertility indicates the actual level of reproductive performance determined by social, cultural, psychological as well as economic factors.. These terms are used quite loosely in medical literature and are sometimes treated as being synonymous.[16]

Fertility measures the rate at which a population adds to itself by births. This measurements may be related to something for example, the total population of the country/total population of the women in the country/region, total women of the child-bearing age, total married women etc. If fertility is measured with respect to married couple, we will be ignorit~~y~~ng births given by unmarried mothers or widows or births which resulted from pregnancies with paramours. The number of births is actually related to exposure to pregnancy.

The crude birth rate provides a first approximation in any study of fertility and has the advantage of bringing out exact rate at which the population increases through births but the major drawback of such an index is that it uses the total population as d~~i~~enominator, although the entire population is never involved in the process of reproduction.[17] However, this measure of fertility is very common particularly in developing countries.

Child-woman ratio is a useful index of fertility as it takes into account only females in the reproductive age group. However, it also suffers from certain drawback. First, it cannot be tabulated for a year other than census year, because age distribution data are available for census years only. Second, it includes only the surviving children below five years of age and not all the children who were actually born. Third, it takes into account all females in 15-44 years age groups, irrespective of their marital status.

The general fertility rate ~~i.e.,~~ is the number of the live births in a year born per mille women of normal reproductive age group. It is a definite improvement over crude birth rate as it takes into account only the female population of reproductive age group but it is not an effective refinement for two reasons. Firstly, it is related to all the women in child-bearing age group irrespective of marital status and secondly, the fecundity of women is not same during the entire span of child-bearing period. It may be pointed out the child-bearing rate is appreciably higher in 20-29 age group than in 15-19 and 30-44 age groups.

Age - specific fertility rate is the average occurrence of live births to the females of a specific age group per mille women in that particular age group. The total fertility rate is another age sex adjusted measure of fertility which has been regarded as the most sensitive and the most meaningful cross-sectional measure of fertility. It may be defined as the average number of children that would be born alive to a woman (or group of woman) during her life time if during her child-bearing years she were to bear children at each age in accord with prevailing age specific fertility rate.

Gross reproduction rate represents the average number of daughters, which ignoring mortality would replace their mothers assuming that the age and sex specific fertility rates for the current period were to continue indefinitely.[18] It is, therefore, a measure of the average number of daughters produced by the woman during her reproductive life span. It is also expressed in terms of female babies born per mille of female population in reproductive age group.

Besides these are some other measures of fertility some of them are, cumulative fertility rate, net reproduction rate, completed fertility rate and cohort fertility.

Determinants of Fertility

The number of births occuring in a year in any population is determined partly by demographic factors such as age and sex distribution, the number of married couples, their duration of marriage etc. The fertility is also related with many other factors of social and economic set up, such as housing conditions, education, income, religion and attitudes towards family size. These determinants may be studied under mainly six broad categories of biological, physiological, demographic, social, economic and political determinants.[19]

Biological Determinants

Biologically speaking, race has been found to be the basic factors generating fertility differences.[20] In New Zealand, for example, Maori ~~moori~~ fertility is much higher than that of whites, and similarly the fertility of the indigenous population of Rhodesia and Zambia is almost twice than that of the Europeans. How far these differences in their fertility are related with their racial differences are not very easy to establish because not all the racial groups living in similar environment may be at the same stage of demographic evolution.

Another biological factor supposed to effect the fertility of a population is health. Although it is very difficult to establish a direct correlation between the health of an individual and his fertility potential, yet there is no denying the fact that bad hygienic conditions can lead to partial or complete sterility.[21] Furthermore, normally one would expect that those enjoying good physical and mental health would be more profilic, but more empirical observations show contrary results as the most under nourished in the world are the most fertile.[22] General health conditions have also an indirect impact upon fertility pattern of the area. Poor health conditions resulting in high incidence of mortality compel the people to go in for large families, so that each couple can have at least two-three survivors. However, with the improvement in the general health conditions, the mortality rate goes down and people start adopting small families.

Physiological Determinants

Fertility is affected by post-partum abstinence. After the birth of a child, the woman is generally sterile for some period, as the menstrual cycle is not resumed, or if it is re-established, the earlier cycles are unovulatory. During this period the possibility of the occurrence of conception is very rare, and hence this period of temporary sterility is known as the post-partum sterile period. It has been reported in many Indian studies that, as a result of breastfeeding, the post-partum amenorrhoea period is longer for Indian women than for American and European women.[23] Fertility is also effected by the restrictions imposed by society or otherwise on reunion or sexual exposure of husband and wife, after the birth of a child. Obviously when this period is long, fertility will be less, when the period is short, husband and wife will get opportunity to meet and chances of fertility are bright and more.[24]

Another physiological constraint on unrestricted fertility is the extent of foetal wastage - that is abortion and still births - which varies from country to country and from place to place. Such information, usually collected through sample interview surveys, suffers from under-reporting.[25]

The physiological factors ~~responsible~~ for ~~the relatively lower fertility~~ in India ~~includes~~ adolescent sterility and longer sterile periods between two births flowing from the practice of breastfeeding the child for a longer duration. The impact of social customs on the physiological factors affecting fertility also needs to be taken into account.

Demographic Determinants

Age structure, sex composition, residence or urbanization and child mortality are the chief demographic determinants of fertility. The age structure of the population is the basic demographic factor of human fertility, because the proportion of population in reproductive age group has a direct bearing upon birth rate. comparisons of birth rates and fertility rates show the important of age structure, Japan's birth rate in 1962 was 17.2 per thousand and similar to that of Norway, which had 17.3, but really her fertility rates (5.1 per hundred) was much lower than that of Norway (6.37) because her age structure was more youthful.[26]

The second demographic determinant affecting the fertility of a population is its sex composition. A balance sex ratio would create normal conditions for an average birth rates. The impact of sex ratio as a determinant of fertility can be well judged when we examine the birth rates of population having sex structure differentials. For example, in India, the urban centre which largely attract male in-migrants and thus suffer from great paucity of females, have low birth rates.

Another demographic determinant leading to the fertility differential is the determinant of residence or degree of urbanization. Rural fertility exceeds urban fertility in both developed and developing countries. A survey which has conducted in India in 1979 reports that rural fertility was higher than the urban fertility. It is because of the fact that in the cities there is high cost of living, which the family with a big size cannot afford. Consequently the couples go on for small families.

Child mortality is another factor which influences fertility. In the past the rate of child mortality was very high. It used to be almost sure and certain that at least one or two children will die. Accordingly the fertility was high so that a cushion was provided for the children who would die at some later stage. Today society has controlled many diseases which used to kill children and no longer show their fatal strength. Accordingly parents now wish to have only as many numbers of children, as they wish to have. This has considerably influenced fertility.[27]

Social Determinants

Religion, literacy, education, age at marriage, Breastfeeding, status of woman, desire of son, polygamy, widowhood and contraceptive methods etc. are main social determinants of fertility.

Religion is considered to be an important factor affecting fertility.[28] Religion constitutes one of the most important cultural context that govern the behaviour of its adherents. Affiliations to a particular religious group not only affect day to day behaviour and attitudes but it is also affects reproductive behaviour.[29] Among all the religions, Islam has been found to exercise greatest control over deliberate attempts to check population growth.

Kingslay Davis observed that in India, although the Muslims and the Hindus live in similar environment yet the birth rates of the Muslims were found significantly higher than those of Hindus.[30] The average number of children born to a Muslim woman is 5.71 as compared to 5.16 to a Hindu female. The differential fertility between two religions is perhaps, mainly due to the fact that the remarriage of widow is allowed in Islam while in Hindu religion it is not. The studies conducted in U.S.A. and Canada have clearly pointed out that the fertility of Roman Catholics has been higher than that of either protestants of Jews.[31] Among the all religious groups, the Muslims have the highest fertility and the Christians the lowest.[32]

There is a curvilinear relationship between the number of children and percentage of females who are literate.[33] A study conducted in Mysore, India revealed that the average number of children born to an illiterate female is 5.5, those who were educated upto high school or more gave birth to only 3.9 children. Part of the difference was due to the higher marriage age of those who were educated upto the high school or more. But when the averages were standardised by duration and age at marriage, the difference between the two persisted, although it was smaller.

The age at marriage is another basic determinant of human fertility. It appears that fertility goes down when marriage takes place at a late stage. In Europe many people marry at a very late stage and in many more cases the people even do not marry at all. It is well known fact that fertility rate is higher in countries where marriages take place at comparatively early ages. In India marriages take place at very young age, but in West Indies marriages take place at late stage but the boys and girls are permitted to have sex relations and even produce children before marriage. Thus it is not universally correct that fertility will be low, if the marriages take place at late stage. Since in India inspite of the fact that marriages take place at young age but sexual relationship is socially permitted.

Breastfeeding is also under social factor which empowers a woman by allowing herto control her own fertility and enhance her health as well as that of her children.[34]

The status granted to the women in the society is also considered to be strong social factor of fertility. Higher fertility in the Islamic World is mostly due to the low status granted to women in society.[35]

Among the various socially rooted determinants of fertility, the desire to have a son in the family has been quite significant.[36] Although all society in the world consider a family complete at the attainment of a son, yet there are certain societies where there is strong social or physiological pressure to have a son in the family due to certain social customs and compulsions.[37] For example, in India in Hindu, the last rites of the deceased parents are ~~mythologically~~ traditionally to be performed by the son. Similarly, in the absence of old age homes, the parents in their old age are dependent upon their sons because ~~their~~ there is a strong social prejudice against the parents living with their daughter. It is in this context, that the desire to have a son has pushed up the Indian fertility rates significantly.

Another social determinant which influences fertility is polygamy.[38] It is a system under which a husband can have more than one wife. This system is not very popular these days.

Widowhood quite obviously influences fertility. It is because without her husband she cannot have legal children, but the effect of widowhood on fertility depends on how soon she decides to remarry and at what age she becomes widow. If a widow decided to remarry immediately then fertility will not be effect, but if she decides to marry at very late stage or not to remarry at all, obviously fertility will be effected.[39]

Several methods of conception control are available today, such as coitus interrupts method, condom, oral pills, loop and abortion. Non of them really satisfies the simple criteria for the ideal birth control method specified by Abraham Stone and Norman E. Himes,[40] who state: "The ideal birth control methods should be harmless, reliable and acceptable".

The recent reduction in fertility in India and some other developing countries of the world is, to some extent, due to birth control or family planning programmes. An intensive government sponsored family planning programme, growing awareness of the desirability of small families, increasing urbanization, spread of education and rise in age at marriage are already bringing down the birth rates.

Economic Determinants

Income and occupation of the couples are the main economic determinants of fertility. Fertility is generally assumed to be a monotonically decreasing function of income. This may be so because a higher level of income is closely associated with better education, favourable occupation, and more important a higher and balanced consumption pattern thus reduced mortality. It has been hypothesised that per capita protein consumption and fertility are inversely correlated and protein intake is directly related with per capita income.[41]

It may be pointed out that income increases, the total and marginal utility of children as source of security and as production agent decreases, while the direct and indirect cost of rearing of an additional child increases. Hence, higher income and increase in income levels will motivate fertility reduction.[42]

Another most important determinant which influences fertility is the occupation of the couple. It is usually seen that those engaged in mental work have less number of children, as compared with those who do same sort of physical labour. Similarly those whose business is much that takes them to clubs and other places of interest and recreation have less number of children. So is the case with people who are engaged in religious institutions and where both husband and wife are employed on white collar jobs.[43]

Empirical research undertaken in a variety of cultures seems to indicate that the relationship between female employment and fertility behaviour depends upon the nature of the economic activity engaged in and the setting in which this activity takes places. In addition the pressure or absence of conflict between mother and worker rates seems to influences the emergence of a fertility - employment relationship.[44] It has been found in several studies that the gainfully employed females have a smaller number of children than those who are not employed.[45] Females began to participate in gainfull employment which provided an alternative to child-bearing and child-rearing.[46]

Political Determinants

Each government provides incentives as well as disincentives to check fertility. Facilities are then provided to those who go in far sterilization or similar other measures to check family size.[47]

From the above discussion it appears that fertility patterns of a population are determined by the combined effects of biological, physiological, demographic, social, economic and political determinants. It is not possible to isolate the rate of any single factor because birth rate is product of all these factors in unison.

MORTALITY

Mortality is the permanent disappearence of all evidence of live at any time after birth has taken place (postnatal cessation of vital functions without capacity of resuscitation). A death can thus occur only after a live birth, and the span between birth and death is life. This does not include any death prior to a live birth.

The infant mortality rate is specially important in the analysis of mortality, because infant deaths account for a substantial number of all deaths, especially in those countries where health conditions are poor. How much the society is advanced very much depends on the extent to which infant mortality has been checked and controlled.[48]

Infants are defined in demography as an exact age group, namely, age 'Zero' or those children in the first year of life who have not yet reached age one.[49] The infant mortality rate is specially the ratio of infant deaths registered during a calender year to the total number of live births in the same year. It is generally considered a very good index of living in a population. If lower the infant mortality rate better is the level of living as well as a good indications of the general health conditions prevailing in a population.[50]

There are various indices which are used to measure the incidence of mortality. Most commonly used measures of mortality are crude death rate, age - specific death rate and expectation of life at birth or average of life expectency. Crude death rate is the number of total registered deaths of a specific year per mille mid-year population. This measure is very useful indicator of the level of mortality in a population, but it suffers from a number of deficiencies. Firstly, it yields only an average value~~s~~ which may be significantly influenced by extreme values of mortality. Secondly, it takes into consideration total population including all age groups exposed to different degree of mortality risks.

Age-specific death rate is an universal truth that incidence of mortality is lowest among the middle age groups, slightly highers among the senile age groups and highest among the infants. This means that the pressure of death is not uniform among various age groups. It also varies between the two sexes. This disaggregation of mortality rate by age and sex can be expressed in terms of persons of a given age/sex per mille population of that age/sex.

The expectation of life at birth is a good measure of the level of mortality which is rather complicated to calculate but it is the most easy to understand, and it is not affected by the age structure of the population. This measure is derived from the life tables which are constructed to summarise the mortality experience of single hypothetical generation or a cohort of people subject to a set of constant age-specific death rates throughout its life times. The term average expectation of life represents of average number of year of life which a cohort of new born babies may be expected to live if they are subjected to the risks to death at each age according to the age-specific mortality rates prevailing in the country at the time to which the measure refers.[51]

Infant deaths are grouped in two categories according to the age at death. The first category consists of those infants who die before they complete four weeks of life and referred to as 'foetal-neo-natal' deaths. The others category consists of those infants who die after they complete four weeks of life and are referred to as 'post-neo-natal' deaths.[52]

Determinants of Mortality

Mortality of a population is determined by a host of environmental, demographic, socio-cultural and economic factors.

Environmental Determinants

The environmental factors like flood, earthquakes, volcanoes and causes of deaths, have caused abrupt loss of life, but more important is the influence of climate and its intricate relationship with disease. We have only to look at the seasonal variations in mortality in Britain, where January deaths may be nearly twice those of August, for an indication of climatic effects. Stamp has stressed on several occasions the effects of climatic variability, isolation aspects, atmospheric pollution, air conditioning and central heating a health and mortality. It is pity that climatic factors are so difficult to isolate. We should also recall the effect of solar and atomic radiations, it is clear that exposure to ionizing radiations increases the risk of developing leukaemia. Moreover, soils and the quality and quantity of water supply may be influential.[53]

Other factors which may cause large scale deaths are natural calamities, wars, epidemic and famines. These factors, of course, were more prominent in the historic past and now the world is [illegible] ~~lightening its grip over~~ the ~~abnormal~~ deaths ~~caused by such factors~~. However, these factors have to be kept in mind whenever an assessment of mortality, in any area is to be made.

Demographic Determinants

Age structure, sex composition and residence are considered under the demographic determinants of mortality. Broadly speaking, the age structure of a population has been mentioned as the most important demographic factor governing the incidence of mortality in a population.[54] Incidence of mortality is highest during the infancy and it declines as the child matures and again increases towards the older ages. Thus the societies having age composition favourable towards infants or old ages have higher risks of mortality as compared to younger and mature age structure societies.

The sex composition of population also influences the mortality patterns. Both human and the animal studies suggest that there is a biological differences between males and females which leads to higher male mortality, though in some developing countries the woman may exhibit higher mortality rates. This high female mortality in these countries is due to the malnutrition, high maternal mortality under poor conditions of medical care and most important the low status granted to the women.

Rural-urban residence has its own contribution to make so far as the patterns of mortality are concerned. In India, survey conducted by the United Nations reported that mortality was lower in Bangalore city than in towns and rural areas. It may be attributed largely to the fact that the limited medical facilities were often concentrated in urban areas. Moreover the urban populations had high literacy rates, better transportation facilities and great awareness of health hazards in comparison to their rural counterparts.

Social Determinants

Social determinants influence the mortality differentials from region to region, country to country and within the country. The closely associated factors categories are general conditions of nutrition, housing and sanitation, literacy and marital status. The mortality patterns of different countries are, by and large, in consonance with their unhygienic conditions. The less developed region which suffers from unhygienic conditions in general show high average mortality.[55] Another important factor which contribute to the reduction in the mortality is improvements in sanitary conditions and public health measures. Similarly, the Mortality rates are also found to be inversely correlated with literacy standards, which govern people knowledge of health hazards. The most illiterate societies suffer a general indifference and apathy to insanitation and hence are characterised by high rates of sickness.[56] The educational attainment of parents, especially that of mothers, has been found to have a significant relationship with the levels of infant mortality.[57]

It has been observed that mortality rates were always lower for married males and females than for the unmarrieds, the reason of this phenomenon may be found in the fact that marriage are selective with respect to the health status of persons, for those who are healthy are more likely to get married, with the result that the rise of dying is also less. Besides, married persons are generally more secure and protected and they usually lead a more rober life than those who are unmarried. All such factors are thought to contribute to lower mortality among married persons.[58]

The advances in technology and improvements in the standards of living aided the fall in mortality in many other ways. Heavy and better clothing to combat severe winters became available and health services and medical research activities were extended.[59]

Economic Determinants

The economic determinants of mortality, mainly the income of individual may be considered as the most significant. It is the income of an individual which not only determines the richness of his diet but also his capacity to avail himself of medical facilities. It is not meant to convey that the rich people can avoid death because the death ultimately knocks at everybody's door. It is only to signify that the income of a person can help him in buying him a medical care. Such differences in the mortality rates of the rich and the poor occur only when there wide enequalities in incomes and the medical facilities are not universally available. Once the medical facilities become universally available the inequalities in the mortality rates of people belonging to different income groups diminish. Generally, there exists a negative correlation between death rate and standard of living/per capita income.[60] The better diet was properly the main cause of the substantial fall in mortality from tuberculosis in England and Wales.[61] The type of economy has also been mentioned as one of the factors governing the mortality rate. It may be said that the industrial societies due to over-crowding environmental pollution, hazards of accidents suffer high death rate in comparison to the agricultural societies which enjoy open air life in sparsely populated wide countryside.[62] The leakage of the toxic gas at the Union Carbide Company in Bhopal which took a heavy toll of life can be one of the examples for the industrial economies in this regards.

A variety of factors are observed which affects or may affect infant mortality differentials but they customarily are classified as biological and socio-economic or environmental factors, though these two categories should not be threated as waterlight compartments, for there is a great deal of interaction between the two. At times it is even possible to modify biological factors by introducing changes in socio-economic factors. For the sake of convenience, however these two factors are discussed separately.

The endogenous (biological) factors are related to the formation of foetus in the womb and are, therefore biological in nature. Among the biological factors affecting foetal and neo-foetal infants mortality rates, the important ones are the age of mother, the birth order, the period of spacing between births prematurity, weight at birth and the fact of multiple births.

It has been generally observed that foetal and neo-natal mortality rates for the first births order is higher among mothers whose age at first parity is below 19 years. With the increase in the age of mothers at the second and third parity, the neo-natal rates come down. Then the death rates increases again with the higher age of the mother, higher parities and higher births orders.

It may also be pointed out that the weight of the baby at birth is also an important factor affecting infant deaths. In United States, it was observed that a low births weight was the cause of two-thirds of all the neo-natal deaths in 1950.

Under the category of exogenous factors we include social, cultural, economic and environmental factors. These factors are found to affect infant mortality, specially during the post-neo-natal period. Post-neo-natal deaths are mainly due to various epidemic caused by community diseases, both of the digestive system, such as diarrhoea and enteritis, and of the respiratory system, such as bronchitis and pneumonia, as well as by faulty feeding patterns and poor hygiene. The underlying environmental factors include crowding and congestion, insanitary surroundings, lack of proper sunshine and fresh air.

Illegitimacy is an important factor contributing to a high infant mortality rate. The difference between infant mortality rates of legitimate and illegitimate births are usually found to be quite marked. The reason for this difference is quite obvious. A child concieved and born out of a wedlock is generally unwanted both by the mother and society. Consequently such a child does not receive the care, in terms of nutrition and other facilities that he needs.

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CHAPTER II

THE STUDY AREA

Uttar Pradesh is the most populous state of India. It supports about 16.44 per cent of India's population having about 9 per cent of the area of the country. Consequently, the average density in the state works to about 471 persons per sq. km (1991). In terms of areas, which is 294,411 km^2, Uttar Pradesh is the fourth largest state of the country. It extends over about 800 km both in its maximum length and breadth running from northwest to southeast and from north to south respectively.

Uttar Pradesh, formerly known as the United Provinces of Agra and Avadh, is a landlocked state situated in the northern part of India between $23^{o}52'$ N to $31^{o}28'$N latitudes and $77^{o}04'$ E to $84^{o}38'$ E longitudes.[01] Situated immediately south of the Himalayas it borders in the north on Nepal and China. This state is bounded by Himachal Pradesh in northwest, Haryana and the Delhi in the west, Rajasthan in the southwest, Madhya Pradesh in the south and Bihar in the east. At the 1991 census the state comprised 63 districts (Fig.01).

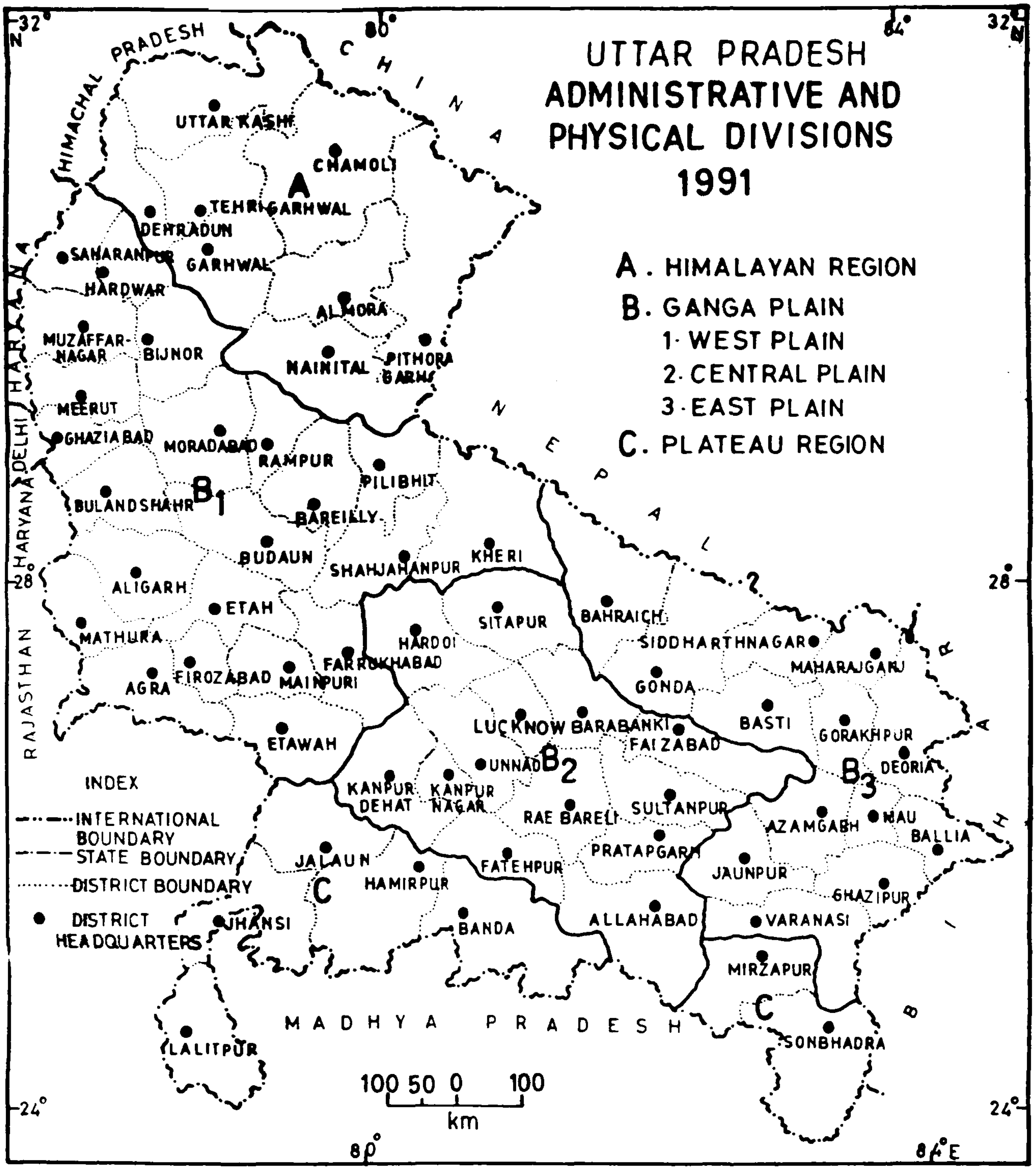
UTTAR PRADESH
ADMINISTRATIVE AND
PHYSICAL DIVISIONS
1991
A. HIMALAYAN REGION
B. GANGA PLAIN
1. WEST PLAIN
2. CENTRAL PLAIN
3. EAST PLAIN
C. PLATEAU REGION
INDEX
INTERNATIONAL BOUNDARY
STATE BOUNDARY
DISTRICT BOUNDARY
DISTRICT HEADQUARTERS
HIMACHAL PRADESH
CHINA
NEPAL
BIHAR
MADHYA PRADESH
RAJASTHAN
HARYANA
DELHI
UTTAR KASHI
CHAMOLI
TEHRI GARHWAL
DEHRADUN
SAHARANPUR
GARHWAL
HARDWAR
ALMORA
MUZAFFAR-NAGAR
BIJNOR
NAINITAL
PITHORA GARH
MEERUT
GHAZIABAD
MORADABAD
RAMPUR
PILIBHIT
BULANDSHAHR
BAREILLY
BUDAUN
SHAHJAHANPUR
KHERI
ALIGARH
ETAH
SITAPUR
BAHRAICH
SIDDHARTHNAGAR
MAHARAJGANJ
MATHURA
HARDOI
FARRUKHABAD
AGRA
FIROZABAD
MAINPURI
GONDA
LUCKNOW
BARABANKI
BASTI
GORAKHPUR
FAIZABAD
DEORIA
ETAWAH
UNNAO
KANPUR DEHAT
KANPUR NAGAR
RAE BARELI
SULTANPUR
AZAMGARH
MAU
BALLIA
JALAUN
PRATAPGARH
FATEHPUR
JAUNPUR
HAMIRPUR
GHAZIPUR
JHANSI
BANDA
ALLAHABAD
VARANASI
MIRZAPUR
SONBHADRA
LALITPUR
100 50 0 100
km
32°
80°
84°
28°
24°
84°E

FIG.01

PHYSIOGRAPHIC OUTLINE

The state of Uttar Pradesh on the basis of its relief and surface drainage can be divided into three distinct physical divisions, namely, the Himalayan region, the Ganga plain and the southern hills and plateau region (Fig.01).

The Himalayan Region

It is the northern most region of the state which comprises eight districts of Uttar Kashi, Chamoli, Garhwal, Tehri Garhwal, Pithoragarh, Almora, Nainital and Dehradun. This region rises from a height of 300 m to a magnificent series of snowclad peaks more than 6,000 m above the sea level. This region covers about one-sixth of the total area of the state.

The northwestern portion of the state lies in the greater Himalayan zone. Here the Himalayas rise rather abruptly to more than 2,000 m. Some of the famous peaks of the Himalayas such as Nanda Devi (7,817m), Kamet (7,756m), Badrinath (7,138m) and Trishul (7,120m) are found in this region. The two great and historic rivers of India, the Ganga and the Yamuna, rise in this region from the glaciers of Gangotri (5,611m) and Jamnotri (6,315m) respectively. This zone is mainly composed of crystalline rocks and is cut by the waters of the Ganga, Yamuna, Ram Ganga and their tributaries. Apart from the valleys, the region is highly dissected and rugged.

The lower Himalayas lie to the south of the greater Himalayas and have a number of longitudinal valleys among which the most famous is the Doon Valley having a width of 24 to 32 km. This zone of moderate height and very sparse population is decorated by a number of beautiful hill stations such as Mussoorie, Chakrata, Nainital, Ranikhet, Almora etc. Due to the ruggedness of the terrain cultivation is possible only in the river valleys and on the terraced hill slopes. The chief raising has recently become notably important. Grain cultivation is done in mainly in Tehri Garhwal, Garhwal, Nainital and Almora districts and fruit cultivation is carried on chiefly in the submontane region of Dehradun.

The sub-Himalayan zone, or the Siwaliks, runs from northwest to southeast and passes through the northern part of Saharanpur district, the southern part of the districts of Dehradun and Garhwal and the middle part of Nainital. The zone ranges from 300 to 600 m in height and is composed of simple type of foldings and faultings.

The Ganga Plain

The Ganga plain covers about two-thirds of the area of Uttar Pradesh and is traversed by the Ganga and its tributaries. The northern part of the Ganga plain, which borders on the Himalayas and extends from Saharanpur to Deoria district, is known as Bhabhar and Tarai and has distinct features of its own. The Bhabhar is the piedmont zone skirting the Siwaliks and is mainly found in the districts of Saharanpur, Hardwar, Bijnor, Garhwal, Nainital, Pilibhit and Gorakhpur. In this area the rivers suddenly flatten and deposit the coarser boulders and gravels brought by them from their upper reaches. The Tarai is a marshy tract covered with forest and long grass. It was originally about 80 to 96 km broad but its width has been greatly diminished by the steady process of settlement and reclamation. The true Tarai is now confined to narrow strip parallel to the Bhabhar which falls in the districts of Saharanpur, Hardwar, Nainital, Rampur, Basti, Siddharthnagar, Gorakhpur, Maharajganj and Deoria. The Bhabhar and Tarai belt are important for the cultivation of rice, wheat and sugarcane.

The Ganga Plain is mostly an alluvial tract of pleistocene and recent deposits of clay and sand. This vast plain is almost a flat tract sloping with an imperceptible gradient of about 21 cm per km towards east and southeast. The monotony of the even surface is broken here and thereby narrow belts of revines formed by gully erosion. These ravines are most conspicuous along the lower Chambal and the Yamuna where they extend, at places, upto 6 to 7 km from the main stream. The river Ghaghra and its tributaries have formed a broad flood plain which during the rains looks like an endless lake. This region is very fertile for cultivation generally on 70 per cent of land of the region. Though a great variety of crops are grown throughout the plain but the chief are wheat, rice, barley, millets, gram and sugarcane.

The Plateau Region

The plateau region, lying in the southernmost part of the state, is the oldest and the most stable landmass which has the rocks of diversified origins. It has never been under water ever since the beginning of the geological history, and its mountains and rocks are resting on firm foundation. The eastern part of the plateau region belongs to the Vindhyan system, whereas the western part comprises rocky highland plateau. The former is composed of sedimentary rocks while the latter is mainly composed of Bundelkhand granite. The whole region is mainly composed of seven districts, namely, Jhansi, Lalitpur, Jalaun, Hamirpur, Banda, Sonbhadra and Mirzapur.

This region lies at the height of about 300 m and the land is not very suitable for agriculture due to the configuration of land. However, jowar, gram and wheat are cultivated on about fifty per cent of the area but the yield is much below the normal. But this region is fairly rich in mineral resources. Limestone, silica, coal, magnesite, shale, calcite, dolemite, marble, quartz, clay etc., are found in this region especially in the sedimentary deposits of the Vindhyas.

Drainage

The drainage system in the state may be divided into three parts[02] - the Ganga system, the Yamuna system and the Ghaghara system. The Ganga originates from the Gangotri glacier of the Himalayas. Its main tributaries are the Yamuna, the Ramganga and Gomati. The Ramganga originates from the Himalayas and joins the Ganga near Kannauj. The Gomati and its main tributary, the Sai, run almost parallel to the Ganga before the Sai joins the Gomati. Only a few kilometres further down the river it merges with the Ganga. There are many other small tributaries in this system. The river system covers the entire central part of the state.

The Yamuna system originates from the Yamunotri glacier and runs almost parallel to the Ganga before joining it at Allahabad. The main tributaries of this river are the Chambal, Betwa and Ken - all originating from the Deccan plateau and running from south to north. The southern part of the state is covered by this system. Formations of ravines are the main physical characteristics of this river system.[03]

The entire northeastern part of the state is covered by the Ghaghara system. The Ghaghara enters the state from the Nepal border and runs parallel to the Ganga, joining it beyond Ballia district. Its main tributaries are the Sharda, the Rapti and the Burhi Gandak. This river system is notorious for floods, which create havoc during monsoons in the region.[04]

Soils

The soils of Uttar Pradesh may be broadly and conveniently studied in terms of physiographic regions of the state. In the Himalayan region real loam, brown forest soils, podsol and meadow soil are found in the northern part of the region, whereas in the southern part of the region pebbly and pourous soils are found which vary from clayey loam to sandy loam and are rich in organic matter. Th colour of sandy loam varies from dark down to reddish brown and it suffers from moisture deficiency due to excessive percolation and a low water absorbing capacity.[05]

The soils of the Ganga plain are mostly of the alluvial type which consist of older alluvium (Bangar) and newer alluvium (Khadar). The former is composed of thick clay beds which are usually replete with calcarious nodules (Kankar) and forms higher ground and is dark in colour, whereas the latter is mainly composed of fine silt and forms the flood plains which are adjacent to the rivers. The soils are deep and very fertile in the western section of the plain. Central part of the plain is composed of loam or sandy loam. The northeastern area of central plain has the soils of loam or sandy loam variety while in rest of the area there are mostly sandy loam in character. Bangar, Bhat and Bhur soils are found in the eastern plain. Patches of Usar or Reh soils are found scattered widely throughout the Ganga plain. These soils are alkaline in character and not fit for agriculture.

In plateau region generally three types of soils, namely, upland or rocky, lowland or black soils (Mar, Kabar) and red and yellow soils (Parua, Rankar), are found. Rocky soils are found mainly in Banda which are locally known as Patha soils. They also include some poorer varieties of Parua, Mar and Kabar soils with texture varying from clay loam to a high degree of fertility and are predominantly clay. Red soils contain such types as Parua and Rankar. The former soil is light sandy and the latter is eroded soil which is mostly found on higher elevation. Red soils have developed over granites and gneisses which have undoubtedly their parent rocks in the western part of this region especially in Jhansi and Lalitpur districts. In the eastern part they are associated with sandstones.[06]

Climate

Uttar Pradesh lies in the warm temperature zone, but great variations in climate occur at different altitudes. The entire state has a tropical monsoon climate, except the Himalayan region where the climate is temperate. For the state of Uttar Pradesh the year may be divided into three distinct seasons - winter from October to February, summer from March to mid-June and monsoon from mid-June to September.[07]

There are wide variations in temperature. In January the temperature varies from 12.5^{o}C to 17.5^{o}C and in May from 27.5^{o}C to 32.5^{o}C, with extremes of 45^{o}C or more. April to June are the hottest months with hot winds blowing from the west. In the northwestern districts winter is quite severe. In the Ganga-Yamuna plains, the ~~average~~ temperature varies from a minimum of 8^{o}C to a maximum of 42^{o}C depending on the time of the year as well as the location of the place.[08]

Nearly 90 per cent of the rainfall in the state is caused by monsoons coming from the Bay of Bengal from June to October. As the monsoon moves westward, its intensity decreases. Due to this phenomenon the eastern part of the state receives more rainfall than the western part. For instance, Varanasi and Gorakhpur receive 1,113 and 1,274 mm of annual rainfall respectively, whereas Meerut and Agra receive only 830 and 765 mm respectively. The entire Uttar Pradesh Himalayan region, except for the snowbound areas, receives heavy rainfall of more than 1,200 mm. The maximum monthly rainfall in the state is received during the months of July and August. November and April are driest months. Winter rainfall is very infrequent and scanty, but very important for the rabi crops. No part of the state receives less than 500 mm of rainfall. Most of the Himalayan region has snowfall from December to March.

DEMOGRAPHIC OUTLINE

The different parts of the Uttar Pradesh present a variety of physical landscape. There is a close relationship between physical factors and the people. The developed areas retain higher proportion of population as compared to less developed tracts. There are 139.11 million population in Uttar Pradesh according to 1991 census which are distributed in different proportions in the region. Out of whole population 111.51 million are rural and 27.60 million are urban. Among the states Uttar Pradesh carries the largest share (16.44 per cent) of the country's population, while Bihar stands second with 10.23 per cent and is followed by Maharashtra (9.33 per cent) and West Bengal (8.06 per cent). But in terms of area Uttar Pradesh stands fourth among the states and occupies 8.96 per cent of the country. Madhya Pradesh (13.48 per cent), Rajasthan (10.41 per cent) and Maharashtra (9.36 per cent) are the three top states as far as area is concerned.

Distribution of Population

The distribution of population among districts of the state is uneven and the range of variation is very large as it runs from 0.23 million in Uttar Kashi to 4.92 million in Allahabad. If total population of Allahabad district be compared with the total population of the states, we find that Himachal Pradesh (5.10 million) is very close to Allahabad while many of the northeastern states carry populations much less than that of this single district. They are Tripura (2.74 million), Manipur (1.82 million), Meghalaya (1.76 million), Nagaland (1.22 million), Goa (1.17 million) and Arunachal Pradesh (0.86 million).

The average population of a district works to 2.20 million. Thirty-three districts out of sixty-three districts have a population of more than this average. There are seven districts each of which has a population of less than one million, whereas there are ten districts with more than 3 million population a piece.

Density of Population

The arithmetical density of population in Uttar Pradesh for the year 1991 works to 471 persons per sq. km.

which is one-and-a-half times more than that of the national average of 267 persons per sq. km. Uttar Pradesh, though standing first in terms of population and fourth in terms of areas comes nineth in terms of density included union territories. Kerala, West Bengal and Delhi are abnormally densely populated states with as high densities as 747, 766 and 6,319 persons per sq. km. respectively. On the contrary Jammu and Kashmir, Nagaland, Sikkim, Andaman and Nicobar Islands, Mizoram and Arunachal Pradesh are states of abnormally low densities of 76, 73, 57, 34, 33 and 10 persons per sq. km. respectively.

The distribution of density among districts of the states varies from 30 in Uttar Kashi to 2,390 in Kanpur Nagar. The wide range of variations in density is the result of physical, social and historical factors. The density of population is generally low in the Himalayan region, Nainital and Dehradun with a density of 229 and 329 are a solitary exception. In the plateau region also it is below the state average but it is relatively less uneven and varies within a comparatively small range of 149 in Lalitpur to 334 in Mirzapur. Some of the districts of the Tarai region and foothill zone of the Himalayas, namely Shahjahanpur (433), Bahraich (400), Pilibhit (365) and Kheri (314) also have densities less than the state average. These districts are partly covered with forests and are not

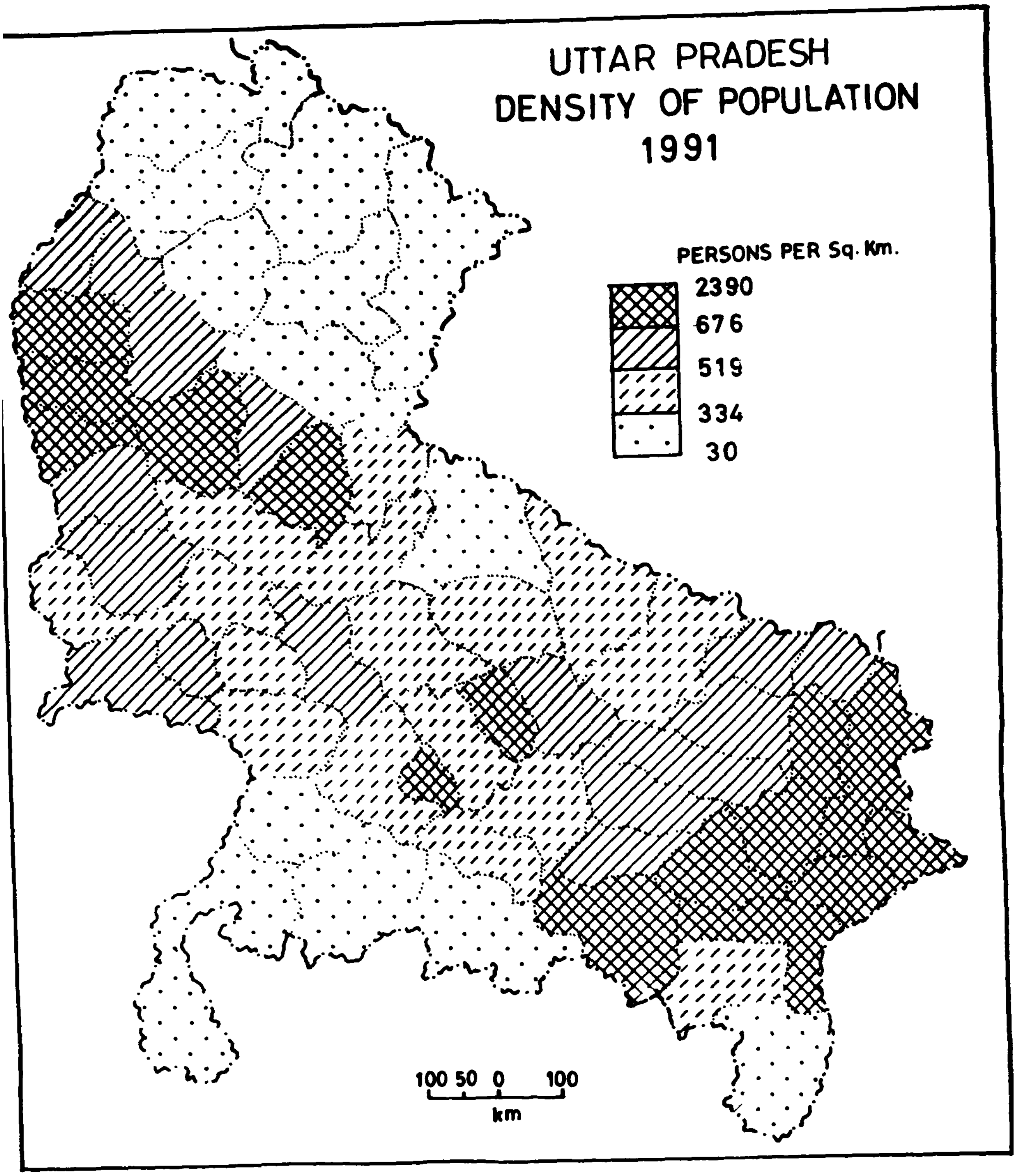
UTTAR PRADESH
DENSITY OF POPULATION
1991
PERSONS PER Sq. Km.
2390
676
519
334
30
100 50 0 100
km

FIG.02

fertile enough to sustain denser populations. Densities exceeding the state average are mainly found in the Ganga plain as depicted in Fig. 02. The reason for the heavy concentration of population in districts of the plain is not far to seek. The region is ideally suited to agriculture and possesses great potential to sustain heavy density of population. In fact, for the general pattern of density distribution it has been rightly observed that low densities are accounted for by forest area, mountainous and swampy nature of the area, little cultivable land and unhealthy climate, while high densities are found in places with good alluvial land, healthy climate and excellent water supply for agriculture.[09]

Sex Ratio

In Uttar Pradesh sex ratio is in favour of males. When a comparison of sex ratio is extended to international scale it is found that the sex ratio of 882 in Uttar Pradesh in 1991 being very low was higher than the lowest sex ratio of 758 in Kuwait recorded in any country of the world in 1991. However, it may be noted that the developed countries such as Federal Republic of Germany, France, Japan, U.K., Hungary, Norway, Switzerland, Denmark, Australia are in favour of high females as compared to developing countries such as Moracco, Kuwait and India.

The distribution of sexes in the states of India is not uniform. It varies from 793 in Chandigarh to 1,040 in Kerala with national average of 929. Uttar Pradesh stands somewhat midway between the two extremes and her ratio of 882 lies well below the national average. Scarcity of women, though a common feature of the population of Indian states, is, however, of relatively considerable magnitude in Uttar Pradesh.

Though the sex ratio in the state and in the majority of the districts is substantially high yet there are twenty-two districts have high sex ratio more than state average 882. Thus, as many as fifty-seven districts out of sixty-three districts have sex ratio in favour of males which vary between the minimum of 811 in Budaun to the maximum of 995 in Jaunpur and last six districts have high sex ratio in favour of females which lies from 1,010 in Azamgarh to 1,128 in Almora.

In Uttar Pradesh 41.65 per cent of total population are children (0-14 years) and 6.84 per cent are older population (60 + years) and the remaining 51.51 per cent constitute the adult workforce who, infact, are not fully employed. The adult population represents the eligible couple who constitute 45.00 per cent of the total population which includes males and females.[10]

Urbanization

Urbanization in Uttar Pradesh has been rather slow because the population has a higher rural composition and primary occupations predominate. Inspite of a 75.90 per cent increase since 1901 only 19.89 per cent of the total people lived in towns in 1991. In Uttar Pradesh there are 42 class I cities having more than 100,000 population. There were 45 class II cities, 129 class III, 236 class IV, 210 class V and 40 class VI with less than 5,000 population.

TABLE 01

NUMBER OF TOWNSIN EACH CLASS

Year	I	II	III	IV	V	VI	Total
1951	16	12	42	71	165	152	458
1961	17	16	52	74	71	9	239
1971	22	20	68	85	77	11	283
1981	30	36	86	196	230	81	659
1991	42	45	129	236	210	40	702

NOTE: Urban areas have been categorised into six population size classes of towns. Class 1:1,00,000+ , Class II :50,000-99,999, Class III: 20,000-49,999, Class IV : 10,000-19,999, Class V : 5,000-9,999, Class VI :Below 5,000.

SOURCE: Bose, Ashish (1994), India's Urban Population 1991 Census Data, States, Districts, Cities and Towns, Wheeler Publishing, New Delhi, p. 374.

Literacy

One of the important characteristics of the population on which information is obtained in the census is literacy. Literacy is in 1991 census, "A person who can both read and write with understanding in any language is taken as 'Literate'. A person who can merely read but cannot write is not a literate. It is not necessary that a person who is literate should have received any formal education or should have passed any minimum educational standard." But, "a person who can neither read nor write or can merely read but cannot write in any language is called as illiterate." Children upto 7 years of age are treated as illiterate even if the child is going to school and has picked up reading and writing. Ability merely to sign ones name is not adequate to qualify a person as being able to write with understanding.

Literacy rate very widely in the states and union territories of the country. Among the states it ranges from 38.54 per cent in Bihar to 90.59 per cent in Kerala with an overall average of 52.11 per cent for the country, whereas in Uttar Pradesh it stands at 41.71 per cent. Only Rajasthan (38.81 per cent), Dadar and Nagar Haveli (39.45 per cent), Arunachal Pradesh (41.22 per cent) are record the literacy rate less than Uttar Pradesh. Thus, in respect of literacy too, this most populous state of the country is, to be sure, quite backward.

Male literacy in Uttar Pradesh is only 55.35 per cent which is about 8 per cent points below the national average of 63.86 per cent. For obvious reasons the literacy percentage among males of both rural and urban population is higher than that amongst the females in Uttar Pradesh as well as in all other states of the country.

ECONOMY AND HEALTH SERVICES

Uttar Pradesh is predominantly an agricultural state with a little more than 80 per cent of the population living in rural areas. Agriculture is the single largest sector of the economy, employing about 72 per cent of the labour force. Agriculture accounts for 46 per cent of the state income. Uttar Pradesh grows Kharif and Rabi crops and the major agricultural products include wheat, rice, sugarcane, bajra, potatoes and tur. The state ranks third in India in terms of the per capita production of food grains, as well as in terms of the growth rate of the production of good grains. The average annual per capita food grain production in the state from 1987-88 to 1989-90 was 249 kilograms. The annual rate of increase of the production of food grains from 1969-70 to 1989-90 was 3.30 per cent.[11]

Industrially, Uttar Pradesh is not well developed. It has few industries which manufacture cement, fertilizers, aluminium and automobiles. The state ranks lowest in terms of the per capita value added to the state income from industries. Mining and manufacturing contribute only 20 per cent to the State income. The average annual per capita income of the state from 1982-83 to 1984-85 was Rs. 1,508. During 1987-88, 37 per cent of the rural population and 27 per cent of the urban population were estimated to be below the poverty line.

Availability of health institutions, health personnel and number of beds per lakh population constitute another landmark in the field of social development. Number of medical institutions in Uttar Pradesh (3.1) consisting of allopathy hospitals, dispensaries and primary health centres together l~~e~~ag very much behind as compared to national figure of 4.20 per lakh population. Similarly, number of hospital beds in Uttar Pradesh constitute only 54 as against 83 per lakh population at national level. Although these figures are relatively better in northern and southern hilly regions and much less in the Ganga plain. They are very inadequate in the context of population density and road facilities. Infact, these poor health facilities are largely responsible for high level of infant mortality reported in Uttar Pradesh.[12]

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CHAPTER III

METHODOLOGY

Regional analysis in modern geography is based on statistical method and 'is in a sense a substitute for the method of controlled experiment, a poor substitute, but the best we have'.[01] The experimental method is useful in natural sciences whereas it is of strictly limited application in other sciences. The experimental method consists essentially in bringing about certain preconceived events in a highly simplified environment. The chemist, for instance, studies a reaction by bringing his chemicals together in a controlled environment with known impurities or with none. An experiment, therefore, is an event or series of events in which only relevant elements are present, or in which, atleast, the irrelevant elements are known.[02] But in regional sciences it is not always possible to perform such as controlled experiments and as such statistical analysis of specific phenomena in small area units are adopted as a substitute of the laboratory experiments of the natural sciences, modern geography has been much influenced by this development and in words of Berry 'regional science has stimulated, prodded and pushed methodological development in geography'.[03]

More specifically, the emergence of regional science has inspired the geographers to be more interested in theories of regional analysis. Population geographers are taking keen interest in the use of scientific research methods in more overt fashion, especially the explicit formulation of hypothesis and their testing, if possible, in a quantitative fashion. They attempt regional analysis of population differentials statistically by setting up certain premises for measurement and data breakdown, computing and mapping necessary coefficients, and by drawing boundary lines separating the 'spheres of influence' which emanate from nuclear areas of adjustment. Side by side with the spatial dimension the geographers also attach considerable significance to the temporal dimensions of analysis. Even in the present day geography there is to be found a tinge of deterministic attitude governed by the philosophy that the events of today are determined by the events of the past. For understanding and explaining the regional pattern of occurrence of a geographic fact and its trends of regional readjustments a reference to the past, therefore, becomes not only relevant but quite essential.

Analysis of regional arrangement of phenomena on the basis of thematically identified regions is of cardinal significance in geographical studies. Besides its academic importance, such as an analysis is of considerable value for regional planning committed to minimizing biased regional disparities or imbalances.[04] Though population has recently been recognized as one of the important areas of geographical study, the published literature on population geography is mostly related to distribution, density, growth and structure of population, whereas the geographic studies of fertility and mortality and the related problems are relatively few. The vital processes are in no way less significant than that of population structure, distribution or mobility in its bearing on the socio-political and economic programmes and problems of a nation. Therefore, the study of fertility and mortality patterns may be regarded as an important aspect of population geography mainly in a country like India where the problem of population has become a matter of serious concern. The main thrust in the regional analysis of fertility and mortality patterns of Uttar Pradesh will be to discuss general trends and districtwise distribution of fertility and mortality by selected measures, to identify the fertility and mortality regions and to explain the role of demographic and non-demographic variables on vital processes differentials in the state.

SELECTION OF THE STUDY AREA

In any regional analysis the assumption of isotropicism is implicit and sometimes is made explicit. By this assumption is meant that space on which socio-economic processes are unfolding is uniform and homogeneous without any technical element. In the real world to obtain such a place is a physical impossibility. There are many demographic, socio-economic and cultural phenomena in every place which undermine any such condition. Therefore, to undertake such a regional analysis scholars usually select such areas where population growth has become a dangerous problem which is directly caused by vital processes-fertility and mortality.

In the present study of growth of rural population in Uttar Pradesh - a regional analysis of fertility and mortality patterns, the author has selected Uttar Pradesh as a case study, which fulfils many of the basic requirements for an ideal place to undertake this analysis.

TECHNIQUES OF ANALYSIS

There are two methods of analysis, namely, observational, descriptive and observational-relational. In the former method the regions of various components are delimited by the geographers and factor analysis and correlation analysis techniques are also used. In the latter method regional boundaries are based on earth features, especially physiography or climate, and the relevant data are assembled according to the resultant areal patterns. This method employs one set of observations to draw the lines and another set to describe the regions. Both the methods are applied in the regional analysis of fertility and mortality patterns of Uttar Pradesh. There are several measures of fertility but some of the selected measures of fertility are briefly pointed out.

Crude Birth Rate (CBR)

Crude birth rate expressed in terms of number of live births in a year per mille of the mid-year population. It may algebraically be expressed as :

$$CBR = \frac{B}{P} X 1000$$

Where B stands for the total number of live births during a year and P stands for the estimated mid-year population.

Child-Woman Ratio (CWR)

Child-woman ratio is expressed in terms of number of children below five years of age per mille females of reproductive age group.

It is calculated as :

$$CWR = \frac{P_0\text{-}4}{P_f 15\text{-}44} \times 1000$$

Where P_0-4 is the number of children under five years of age and P_f15-44 stands for females of child-bearing age.

General Fertility Rate (GFR)

It is the number of live births per mille females of normal reproductive age group. It is calculated as :

$$GFR = \frac{T_b}{T_f\ 15\text{-}49} \times 1000$$

Where T_b refers to the number of live births in a year and T_f 15-49 to the number of females in normal reproductive age group.

Age-Specific Fertility Rate (ASFR)

It is calculated by using by the formula :

$$ASFR = \frac{B_{fa}}{P_{fa}} \times 1000$$

Where B_{fa} stands for number of births to a female of a given age group (say 15-19, 20-24 and so on) and P_{fa} stands for total females population in the specific age group.

General Marital Fertility Rate (GMFR)

Algebraically it can be expressed as :

$$GMFR = \frac{LB}{MF\ (15\text{-}49)} \times 1000$$

Where LB is legitimate births and MF(15-49) refers to married females in age group 15-49. Thus, the GMFR is the number of births per mille of married females of child-bearing age.

Mortality is the second major component of population growth. It constitutes one of the most readily observable process of population growth and is expressed as occuring of deaths. There are several measures of mortality, some of them are briefly pointed out.

Crude Death Rate (CDR)

Crude death rate is computed as :

$$CDR = \frac{D}{P} \times 1000$$

Where D is the total number of deaths in a year and P refers to the mid-year population for that year.

Age-Specific Death Rate (ASDR)

Age-specific death rate can be calculated as :

$$ASDR = \frac{D\ as}{P\ as} \times 1000$$

Where D as stands for the number of deaths of specific age and sex during a year and P as stands for the total mid-year population of specific age/sex.

Infant Death Rate (IDR)

Infant death rate can be found out with the help of following formula:

$$IDR = \frac{D}{B} \times 1000$$

Where D = deaths under one year of age during the year and B = total registered births.

Only two measures each of fertility and mortality are taken into account for the present analysis. They are crude birth rate, child-woman ratio, crude death rate and infant death rate. Fertility and mortality rates through these measures may be easily obtained.

SELECTION OF VARIABLES AND ADVANCED TECHNIQUES APPLIED

Selection of variables is a crucial exercise as the whole edifice of the study is built on the quality and type of variables. The importance of variables varies from study to study depending on nature and requirement of individual study. Many geographers, demographers engaged in vital process studies have laid emphasis on one or the other factor to suit their requirement. A critical assessment of earlier studies has helped in identifying relevant independent variables for the analysis of fertility and mortality patterns in Uttar Pradesh, they are given in Table 02.

Appropriate operational techniques for analysis are found in two research traditions in geography : Multivariate regionalization and factorial analysis. The methodology of multivariate regionalization which structures variables according to some theoretical constructs, it allows the constructs to emerge from the interrelations of the variables themselves. It starts with the matrix of inter-correlations of original variables from which such a set of smaller number of variables is derived that reproduce original relationships with the restriction that derived variables are independent (orthogonal) of each other.

The methods of classification of variables into major dimensions in the two traditions have their respective advantage. The additive method involves simple calculation and there is little ambiguity involved as all the subjective elements are usually known and made explicit. Moreover, since they imply no assumption of orthogonality of dimensions, relationships among them may be evaluated and analyzed. Such methods of classification are quite valied, if theoretical constructs are acceptable and addition of the

TABLE 02

DEMOGRAPHIC AND NON-DEMOGRAPHIC INDEPENDENT VARIABLES

Variable	Definition
X_{01}	Density of population
X_{02}	Migration rate
X_{03}	Percentage of urbanization
X_{04}	Percentage of Hindus population
X_{05}	Percentage of Muslims population
X_{06}	Percentage of Christians population
X_{07}	Percentage of Scheduled Castes and Scheduled Tribes population
X_{08}	Infra-structure facilities
X_{09}	Female age at marriage
X_{10}	Per capita income at current prices in Rs.
X_{11}	Per capita food-grain availability in kg.
X_{12}	Land productivity in quintals per hectare
X_{13}	Value of net total output per worker in Rs.'000
X_{14}	Number of medical hospitals, dispensaries per lakh population
X_{15}	Number of hospital beds per lakh population
X_{16}	Number of doctors per lakh population
X_{17}	Number of child-care hospitals per lakh population

TABLE 02 (Contd.)

X_{18}	Number of mother and infant welfare centres per lakh population
X_{19}	Number of family welfare clinics per lakh population
X_{20}	Per capita government expenditure in Rs. on health services
X_{21}	Percentage of population growth
X_{22}	Total dependency ratio
X_{23}	Juvenile dependency ratio
X_{24}	Senile dependency ratio
X_{25}	Sex ratio
X_{26}	Literacy rate
X_{27}	Female literacy rate
X_{28}	Percentage of female education upto primary school
X_{29}	Percentage of female education upto middle school
X_{30}	Percentage of female education upto high school and intermediate
X_{31}	Percentage of female graduates and others
X_{32}	Percentage of female married population in age group 15-19

TABLE 02 (Contd.)

X_{33}	Percentage of female married population in age group 20-24
X_{34}	Percentage of population in agricultural activity
X_{35}	Percentage of population in non-agricultural activity
X_{36}	Percentage of female population in agricultural activity
X_{37}	Percentage of female population in non-agricultural activity
X_{38}	Birth rate
X_{39}	Child-woman ratio
X_{40}	Death rate
X_{41}	Infant death rate

The data of some of the districts were not available, they had been adjusted from the previous records and the data of adjacent districts.
The relevant data of some of the variables were not available, they had also been adjusted.

variables is legitimate. However, assignment of equal rank differences to varying magnitudes of a variable results in considerable loss of information, standardization procedure, usually that of zero mean, and unit ~~unite~~ variance over comes much of the loss of information. Nevertheless, simple addition without giving consideration to the significance of the constituent indicators of a dimension cannot represent a major part of the reality. This problem is largely solved by factor analysis because loading's of variables on a factor (dimension) are their weights which are derived from their actual interrelationship. But factor analysis procedure starts with a solution which is not mathematically unique.

The technique of factor analysis, initially developed by psychologists early in the present century as a means of analysing the results from intelligence test,[05] and latter used by other disciplines, is a method of studying simultaneously the complex interrelationship between many variables, as measured for many different observations and summarising salient features of relationship in the form of a few basic patterns called factors. Although studies of a geographic nature was under taken at an early date by Sociologists[06], the techniques has been used recently by geographers. Examples of research by geographers incorporating factor analysis include economic regionalizations,[07] climatic regionalization,[08] classification of cities,[09] the regionalization of urban areas[10] and the analysis of commodity flow patterns.[11]

Factor analysis rewrites only the common variance as a new set of variables. One of the ways which geographers use is known as 'estimating the communality'which is that proportion of the variance of the variable which is its common variance (i.e., is shared with that of the other variables in the analysis). The usual procedure is to employ the squared multiple correlation coefficient of each variable against all of the others in the analysis, as the estimate, since our interpretation of this is as an index of the proportion of the variance in the dependent variable accounted for by all combined variance of the independents. These communality estimates are thus 'guesses' of the proportion of the common variance and they are entered in the trace of the correlation matrix (the principal diagonal), their sum is the total common variance of what is to be analyzed. What this communality estimation procedure does is to weight the importance of each variable in the factor analysis according to the strength of its correlation with the other variables. Having estimated the communalities, a principal area factor analysis extracting the factors from the correlation matrix in serial order of eigen value size.

To a large extent the aim of factor analysis is to define new variables of factors that adequately and clearly describe the original set of variables. The ideal is to search for a simple factor structure where by each original variable loads high on one factor and low on the second. Unfortunately, what often happens is that the initial solution derived by a factor analysis programme does not provide such a neat and clean factor structure. Therefore, an alternative solution is needed in which the factors are rotated to provide a better description of the variable pattern. Rotation of the factors therefore, aims at simplifying the factor matrix by separating out significant clusters of variables, without altering their relative positions.

Eigen values are the sum of squared factor loadings for each factor and indicate the amount and proportion of the total variance in the original data accounted for by each factor. Factors are extracted in descending order of magnitude and are orthogonal or essentially uncorrelated with each other. The sum of the squared factor loadings across each row of the matrix are know as communalities and tell the proportion of the total variance of each variable, which is accounted for by the 'X' factors together.

One of the most difficult tasks in factor analysis, however, is the identification or giving some meaning to the newly produced factors in the light of the original data, because variables may load about equally with a number of factors rather than correlate with as few factors as possible. The factors are extracted in descending order, according to their importance i.e., in order of their contribution to total variance of the data matrix.

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CHAPTER IV

POPULATION GROWTH

The purpose of this chapter is firstly to examine the trends of population growth in India in general and Uttar Pradesh in particular, since 1901, and secondly to discuss the regional patterns of decadal growth of population in Uttar Pradesh since 1951.

TRENDS OF POPULATION GROWTH (1901-91)

In India the trends of population growth were examined since the beginning of the twentieth century. The ninety years of growth revealed three distinct periods in demographic growth of India : 1901-1921, 1921-1951 and 1951-1991 (Table 03). During 1901-1921 India's population growth was extremely slow and sporadic (5.75 per cent during 1901-11 and -0.31 per cent during 1911-21) with several of the areas experiencing absolute decline. The demographic change in this period was essentially a story of calamities happenings - like famines, epidemics etc. taking heavy toll of human life. High death rates tended to cancel out high birth rates (estimated at well above 40 per thousand).[01]

In sharp contrast to this, the following 30 years, 1921-1951, recorded an increase of over 109 million (11 per cent during 1921-31, 14.22 per cent during 1931-41 and

TABLE 03

TRENDS OF POPULATION GROWTH IN UTTAR PRADESH AND INDIA 1901 - 91

(in per cent)

Decade	Uttar Pradesh			India		
	Total	Rural	Urban	Total	Rural	Urban
1901-11	-0.97	-0.08	-0.87	5.75	6.40	-0.14
1911-21	-3.08	-3.50	-0.40	-0.31	-1.40	8.25
1921-31	6.66	5.60	12.80	11.00	10.40	19.08
1931-41	13.57	12.00	26.10	14.22	11.80	32.09
1941-51	11.82	10.30	23.20	13.31	9.60	41.49
1951-61	16.66	17.70	9.70	21.51	21.40	25.85
1961-71	19.78	18.20	30.70	24.80	21.80	37.91
1971-81	25.49	19.80	61.22	24.75	18.96	46.02
1981-91	25.41	22.44	38.97	23.56	19.71	36.19

Source - Census of India, Uttar Pradesh, 1961, 1971, 1981 and 1991.

13.31 per cent during 1941-51) with increasing control over epidemic and endemic diseases, improvement in means of communication, and development in economy, particularly in agriculture.[02]

The years 1921 and 1951 have been recognized as the two critical points in the history of population growth in India during the current century.[03,04,05,06 and 07] It seems that India entered the second stage of demographic transition around 1921 when a period of fluctuating birth and death rates ended and that of stable birth rates and consistently declining death rates started. The country moved into an explosive phase of the second stage around 1951 after which birth rates came down only marginally but death rates fell sharply.[08]

The period 1951-1991 has, however, far surpassed all previous records (21.51 per cent during 1951-61, 24.80 per cent during 1961-71, 24.75 per cent during 1971-81 and 23.56 per cent during 1981-91). Table 03 shows that India's population in this period of 40 years has shot up. It is because the impact of various types of national and state activities under Five Year Plans, improved conditions of food supply and medical services which cutted down the death rate.[09]

It is evident from the Fig. 03 that the rate of population growth in the state is increasing more than the

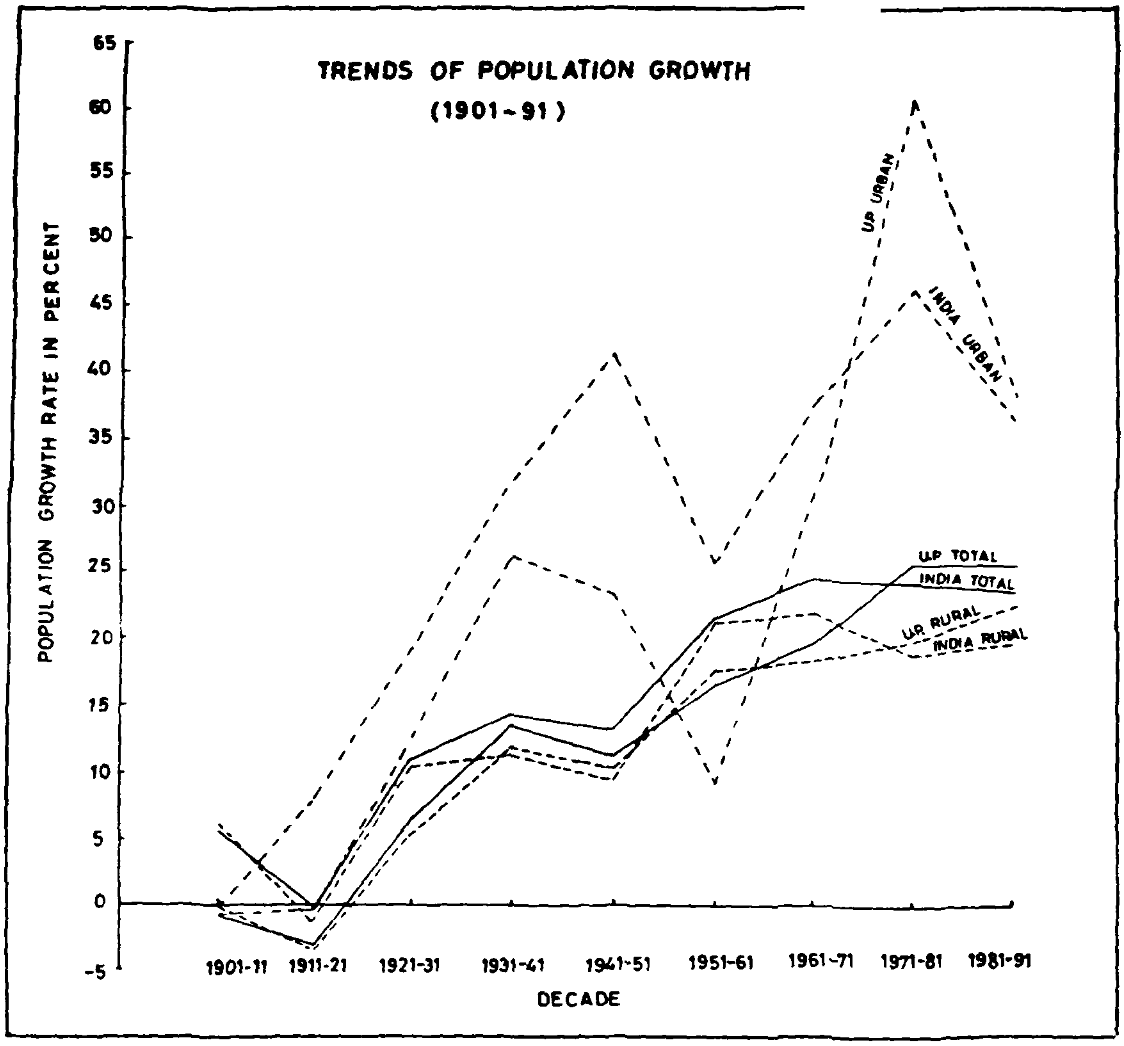

TRENDS OF POPULATION GROWTH
(1901-91)
POPULATION GROWTH RATE IN PERCENT
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
U.P URBAN
INDIA URBAN
U.P TOTAL
INDIA TOTAL
U.P. RURAL
INDIA RURAL
1901-11
1911-21
1921-31
1931-41
1941-51
1951-61
1961-71
1971-81
1981-91
DECADE

FIG.03

country average for the last two decades. Population growth in Uttar Pradesh has shown marked fluctuations from the decade 1901 to 1991. The first decade of the century (1901-11) recorded a decline of -0.97 per cent owing to prevalence of high death rate consequent upon severe incidence of bubonic plague, women at reproductive period of life suffered heavily in particular. Besides these unusual calamities the state lost a larger population on account of balance of migration. There were large immigrations to Calcutta and other parts of Bengal, Bihar, Assam and Nepal and also to foreign countries.[10] One-and-a-half million population declined during 1911-21, which showed a net decrease of -3.08 per cent. During 1921-31, the growth rate marked an increase of 6.66 per cent and further it recorded an increase of 13.57 per cent during 1931-41. During the decade of 1941-51 growth rate decreased to 11.82 per cent. The upward trend of population growth since 1951 had been remarkable. The decade 1951-61 witnessed an increase of 16.66 per cent in the state while that of India by 21.51 per cent. However, the two decades of 1961-71 and 1971-81 witnessed the increase of 19.78 per cent and 25.49 per cent respectively. It shows that post-independence developments had been more effective in accelerating the growth of population in the state.[11] The decadal growth of population (25.41 per cent) in 1981-91, however, was marginally lower than the previous decade (25.49 per cent) because of the impact of various types of state activities under the Five Year Plans and improved conditions of food supply and medical services which cut down the death rate in an unprecedented manner.[12]

Thus, it is clear from the above discussion that the trends of population growth in Uttar Pradesh is fluctuating. However, the recent declining growth rate is in favour of development potential of the state.

Rural/Urban Differentials

An understanding of the dynamics of the population will be neither complete nor clear without making a reference to the differentials in the growth rates of its two vital components - rural and urban. Although the general population in India has experienced consistent acceleration in growth since 1921, the increase in rural and urban population reveals differing trends. While during 1921-51 the rural population was increased uniformly at a medium rate of about 10 to 11 per cent, its urban counter-part grew at high rates which were rising regularly at 19.08 per cent during 1921-31, 32.09 per cent during 1931-41 and 41.49 per cent during 1941-51. The urban rate, however, slackened during 1951-61 (25.85 per cent), in sharp contrast to this rural rate doubled from 9.60 per cent during 1941-51 to 21.40 per cent during 1951-61. However, the rate of growth of urban population shot up again to 37.91 per cent during 1961-71 and 46.02 per cent during 1971-81, while the rural population increased by 21.80 per cent during 1961-71, but lowered down to about 18.96 per cent during 1971-81. During the last decade 1981-91 rural population growth increased to 19.71 per cent while urban growth rate declined to 36.19 per cent (Table 03). In actual numbers almost two-thirds of the total increase in India's population still took place in rural areas during the decade 1971-81. The doubling of the rate of growth of rural population during the post independence period, as compared to what prevailed during 1921-51, and the massive increase which it has given rise to in absolute terms has created serious problems of under-employment and unemployment in the countryside.[13]

It is now commonly agreed that despite a lot extensification and intensification of agriculture during the past thirty years, the stage has reached when farmland will not be able to absorb additional workforce in the villages any more.[14]

In Uttar Pradesh during 1901-21, the population growth urban areas decreased sharply in both the rural and during 1921-31 increase in the rural and urban population growth was respectively 5.60 per cent and 12.80 per cent, and 12.00 per cent and 26.10 per cent during 1931-41. It tended to decline during 1941-51 (10.30 per cent rural and 23.20 per cent urban), whereas during 1951-61 rural growth rate increased to 17.70 per cent and the urban rates became less than half of the preceding decade (9.70 per cent). The urban growth rates tended to be faster during 1961-71 (30.70 per cent) and 1971-81 (61.22 per cent), while during 1981-91 it further lowered down to 38.97 per cent. The rural rates of population growth was found to be a slightly increasing trend as it was 18.20 per cent in 1961-71, 19.80 per cent in 1971-81 and 22.44 per cent in 1981-91 (Table 03). It may be pointed out that the rural economy must have undergone structural changes and the non-agricultural sector must be so expanded and diversified that it became an important source of employment to extra workers in the villages. It is in context, that among other objectives, decentralization of industrial development is suggested as a possible solution of the growing menace of unemployment in the villages.[15]

It may be pointed out that the rate of increase in rural population attributed to many factors including lower educational attainment, low female employment and dull economic conditions in rural areas.[16] At this juncture we find ample variations in the regional trends of rural-urban population growth. Each one shows a significant variation in the trends of population growth by location. Apparently, the differences in the state may be attributed to the physical factors such as altitudes, relief, drainage, soils, climate etc., on one hand and the facilities extended to the people in respective districts in rural and urban areas on the other.[17]

REGIONAL PATTERNS OF POPULATION GROWTH SINCE 1951

Population Growth 1951-61

General Distribution

The distribution of population growth among the districts during 1951-61 may be arranged into quartiles of 9.30 to 14.10 per cent (very low to low), 14.10 to 17.40 per cent (low to median), 17.40 to 19.60 per cent (median to high) and 19.60 to 73.10 per cent (high to very high). Fig. 04 shows that one distinct region of high to very high grade of population growth is found in southwestern part of the state. The other lies in the western part to include one district of the Himalayan zone (Nainital) and four districts of west plain (Bijnor, Moradabad, Rampur and Pilibhit). Twelve districts lying under median to high rates of population growth form three distinct regions: one is found in northwestern part of the state; composed of Dehradun (18.60), Shaharanpur (19.30), Hardwar (19.30), Muzaffarnagar

(18.30), Meerut and Ghaziabad (18.90) districts; second is found in the central part and comprises three districts of Mainpuri, Firozabad and Farrukhabad, and the third in south-eastern part to include the districts of Fatehpur, Allahabad and Varanasi. Three small regions of median to low grade of population growth rates are identified on the plains - one in the west, second in the centre and third in the east, and one distinct region is comprised of half of the districts of the Himalayan zone. A prominent region of low to very low rates (14.10 - 9.30 per cent) of population growth occurs in the eastern half of the state as shown in Fig. 04.

Rural/Urban Distribution

The distribution of rural population growth as shown in Table 04 is almost identical with total rate, however, it has notable regional variations. The districts of high to very high growth rates (22.40 - 79.30 per cent) form two distinct regions : one lies almost in the northern part of the west plain and the other in southwestern corner of the state. The former is composed of Saharanpur (22.40 per cent), Hardwar (22.40 per cent), Muzaffarnagar (23.30 per cent), Bijnor (33.10 per cent), Moradabad (22.70 per cent), Rampur (44.00 per cent), Nainital (79.30 per cent) and Pilibhit (23.90 per cent), and the latter comprises five districts of Etawah (23.60 per cent), Jalaun (24.40 per cent), Hamirpur (23.80 per cent), Jhansi (24.20 per cent)

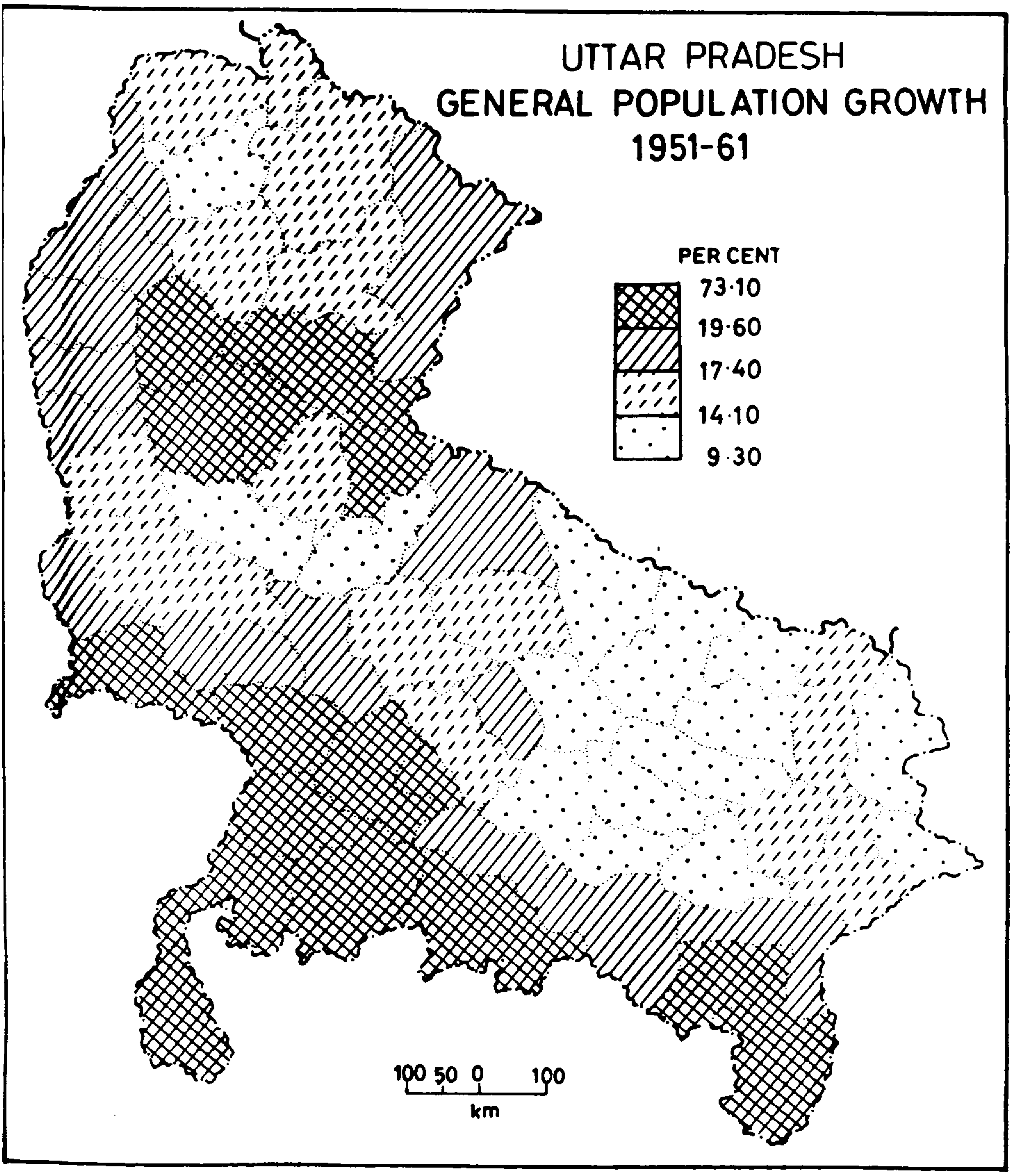
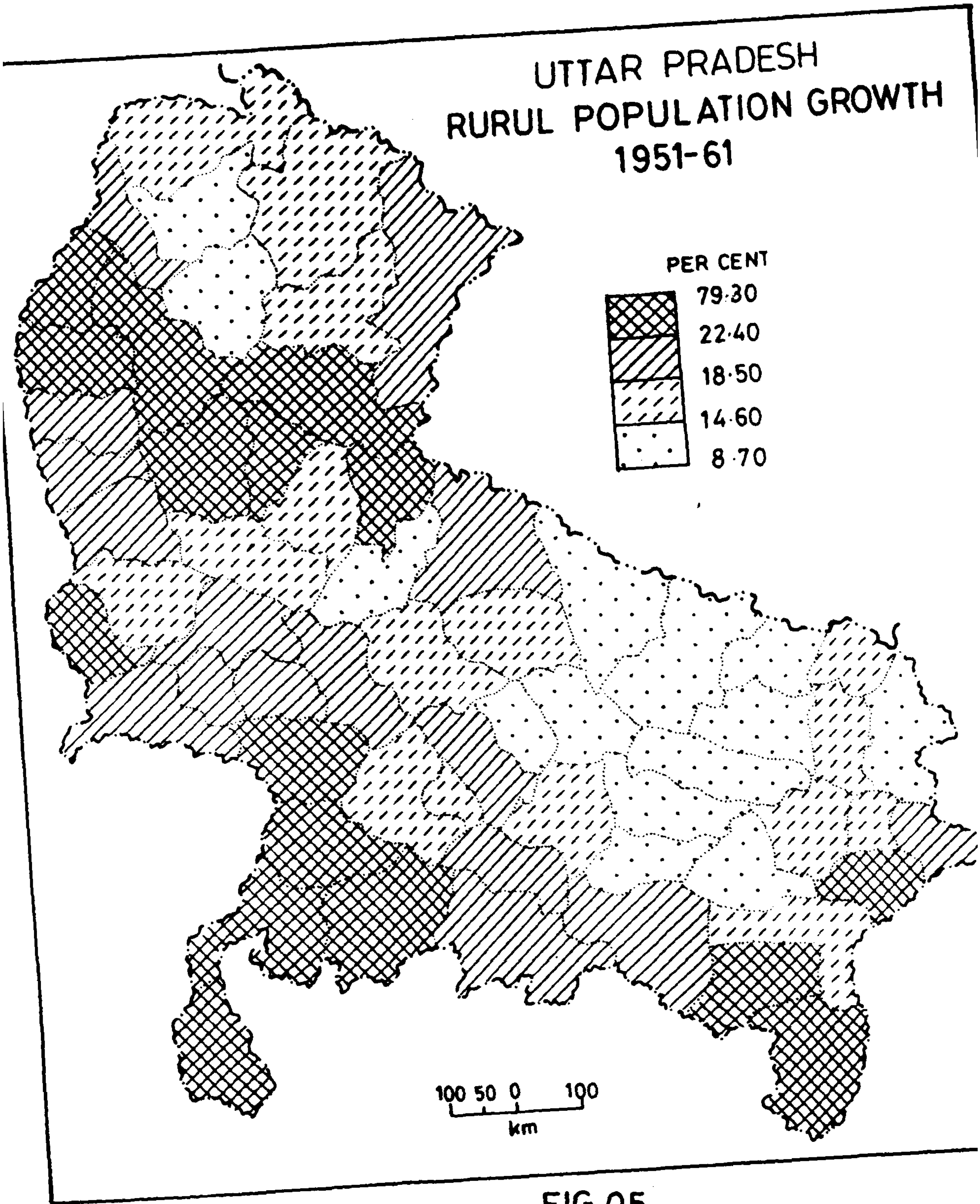

UTTAR PRADESH
GENERAL POPULATION GROWTH
1951-61
PER CENT
73·10
19·60
17·40
14·10
9·30
100 50 0 100
km

FIG.04

and Lalitpur (24.20 per cent). A discontinuous narrow belt of median to high rates of rural population growth is observed in the southern sections of the central and west plains. It stretches from Meerut in the northwest to Allahabad in the east (Fig.05). Small patches of median to low slabs are scattered over eastern, central and west plains, and the Himalayan zone. As many as about sixty-three per cent districts of the low to very grade forms a dominant region in the eastern half of the state, it is comprised of northern districts of central plain and the western districts of the east plain.

The distribution patterns of urban population growth in Uttar Pradesh is far from uniform and varies from 122.20 to -63.90 per cent with a maximum positive growth in Uttar Kashi and a maximum negative growth in Ghazipur, whereas the average for the state accounts for 9.70 per cent. The state may be divided into five grades (three of the positive and two of the negative urban growth rate). The distribution shows that fifty-four per cent districts have the higher urban population growth than the state average.

In the state, forty-two districts have positive growth rate. Of which sixteen recorded the urban growth rates of more than 20 per cent. Among these only nine districts form two distinct regions of relatively very high urban growth rates. One lies in the Himalayan zone and the


UTTAR PRADESH
RURUL POPULATION GROWTH
1951-61
PER CENT
79·30
22·40
18·50
14·60
8·70
100 50 0 100
km

FIG·05

other in the southeastern part of the state. The former comprises the districts of Uttar Kashi (122.20 per cent), Tehri Garhwal (27.80 per cent), Garhwal (53.30 per cent), Almora (25.60 per cent) and Nainital (51.60 per cent), whereas the latter one includes four districts, namely, Allahabad (21.30 per cent), Varanasi (33.10 per cent), Mirzapur and Sonbhadra (25.80 per cent) as shown in Fig.06. Other districts of this grade are scattered so sporadically that they do not constitute any identifiable region. A discontinuous region of medium urban population growth (10.00 - 20.00 per cent) is formed in the western part of the state, interrupted by Muzaffarnagar to include the districts of Dehradun (15.20 per cent), Saharanpur (10.20 per cent), Hardwar (10.20 per cent), Meerut (11.80 per cent), Ghaziabad (11.80 per cent), Moradabad (10.40 per cent), Rampur (16.30 per cent) and Bareilly (16.40 per cent). Other small region of this grade is found in almost northeastern part of the state and comprises the three districts of Sitapur (17.70 per cent), Bahraich (11.20 per cent) and Gonda (10.50 per cent). Two significant regions of relatively low positive growth rates (below 10.00 per cent) are found. One comprises mainly the eastern districts of west plain and the other some districts of central and east plains. Table 04 shows that thirty-one per cent districts fall under the negative growth rates of urban

TABLE 04

DISTRICT WISE PERCENTAGE OF POPULATION GROWTH BY DECADES IN UTTAR PRADESH, 1951-91

District	1951-61			1961-71			1971-81			1981-91		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Uttar Kashi	15.80	14.60	122.20	20.30	18.00	124.90	29.20	25.30	120.50	24.52	21.17	29.23
Chamoli	16.70	16.70	N.U.P	15.60	10.80	N.U.P.	24.50	19.10	139.00	18.21	17.89	21.84
Tehri Garhwal	13.50	13.20	27.80	14.30	13.70	38.50	25.30	23.30	95.20	15.60	13.67	60.53
Dehradun	18.60	21.60	15.20	34.60	32.20	37.40	31.90	27.50	37.00	33.22	28.47	38.19
Garhwal	14.10	12.40	53.30	14.70	13.90	26.70	15.30	11.00	79.80	5.79	2.89	32.58
Pithoragarh	18.50	18.50	N.U.P.	19.00	14.50	N.U.P.	17.90	14.60	126.30	14.55	12.12	56.02
Almora	15.00	14.60	25.60	18.40	17.30	43.60	16.80	15.60	36.70	8.38	8.96	-0.34
Nainital	73.10	79.30	51.60	37.60	33.10	55.90	43.90	34.00	78.70	39.49	31.76	59.87
Bijnor	21.00	33.10	-17.20	25.10	22.70	37.70	30.10	19.10	78.30	26.83	26.48	27.88
Moradabad	19.70	22.70	10.40	23.10	20.60	31.90	29.70	24.20	49.00	30.32	29.41	32.79
Rampur	25.30	44.00	16.30	28.50	30.50	20.60	30.80	19.10	79.00	27.13	28.15	24.32
Saharanpur	19.30	22.40	10.20	27.20	26.40	29.80	30.10	24.00	50.00	26.37	26.18	26.94
Hardwar	19.30	22.40	10.20	27.20	26.40	29.80	30.10	24.00	50.00	25.96	23.47	31.87
Muzaffarnagar	18.30	23.30	-6.90	24.70	23.80	30.70	26.20	14.70	97.70	30.26	27.11	41.47
Meerut	18.90	20.90	11.80	24.10	18.40	46.20	25.30	11.10	74.50	23.96	13.36	47.32
Ghaziabad	18.90	20.90	11.80	24.10	18.40	46.20	37.10	20.10	90.50	49.48	21.60	103.31
Bulandshahr	15.80	19.80	-5.80	19.29	18.40	25.70	24.70	15.60	84.70	19.84	17.42	29.92
Aligarh	14.40	17.90	-1.00	19.60	17.30	31.50	21.90	14.30	57.10	27.64	23.99	39.87
Mathura	17.40	22.60	-2.70	20.40	20.80	18.50	20.90	14.30	54.50	23.15	19.36	37.36
Agra	24.00	19.00	34.20	24.00	22.50	26.50	23.60	20.70	28.60	21.98	16.26	31.44
Firozabad	18.80	19.10	15.80	22.40	21.00	40.00	19.40	16.00	56.70	21.58	17.91	32.98
Etah	15.60	19.10	9.60	20.90	20.60	23.30	18.30	10.90	86.70	20.53	18.74	30.30
Mainpuri	18.80	19.10	15.80	22.40	21.00	40.00	19.40	16.00	56.70	22.94	20.24	44.15
Budaun	12.80	16.90	-18.00	16.60	15.40	29.10	19.80	10.80	106.80	23.74	21.47	35.54
Bareilly	16.50	16.50	16.40	20.40	20.10	21.50	27.70	16.70	66.20	24.12	17.85	39.48
Pilibhit	22.20	23.90	12.20	22.10	22.10	21.90	34.10	30.10	59.10	26.93	23.49	44.69
Shahjahanpur	12.50	13.90	4.80	13.80	12.10	24.40	28.10	21.90	62.90	20.29	18.19	29.02
Kheri	18.90	21.20	9.90	18.10	17.30	32.70	31.40	26.60	102.90	23.62	22.15	37.43
Sitapur	15.90	15.80	17.70	17.20	17.30	15.[illegible]	24.00	20.30	69.30	21.94	19.59	42.43
Hardoi	15.50	17.80	-6.80	17.60	16.80	27.[illegible]	23.00	18.80	72.10	20.51	19.55	28.19
Unnao	15.00	18.50	-47.40	21.00	20.80	28.30	22.80	11.10	66.40	20.61	18.20	38.46
Lucknow	18.70	11.20	27.40	20.80	17.60	24.10	24.50	20.20	28.70	35.69	7.82	60.80

TABLE 04 (Contd.)

Rae Bareli	13.70	15.30	-21.00	14.30	13.80	29.00	24.90	19.80	170.40	22.99	20.73	51.32
Farrukhabad	18.50	20.90	2.30	20.20	20.40	18.70	25.20	17.80	85.30	23.87	19.94	44.32
Etawah	21.80	23.60	6.10	22.50	21.50	32;10	20.40	13.70	81.80	21.26	19.82	29.54
Kanpur Dehat	22.80	15.10	35.70	25.80	22.00	31.30	24.90	17.20	35.20	19.26	18.33	36.98
Kanpur Nagar	22.80	15.10	35.70	25.80	22.00	31.30	24.90	17.20	35.20	27.81	22.22	28.85
Jalaun	19.80	24.40	-4.30	22.70	21.30	32.10	21.20	12.60	75.70	23.40	20.02	36.98
Jhansi	23.50	24.20	21.50	20.20	19.00	24.00	30.70	20.30	52.00	25.50	21.87	31.44
Lalitpur	23.50	24.20	21.50	20.20	19.00	24.00	32.20	26.70	83.40	29.08	27.85	37.10
Hamirpur	19.60	23.80	-10.90	24.40	22.30	47.20	20.80	11.90	102.50	22.74	21.57	28.59
Banda	20.70	21.70	7.90	24.00	21.80	54.40	29.80	24.80	84.90	22.20	20.85	32.28
Fatehpur	18.10	19.60	-10.30	19.90	17.90	68.20	23.00	18.60	96.50	20.41	19.20	32.71
Pratapgarh	13.10	13.90	-19.00	13.60	13.30	30.40	26.60	22.60	225.70	22.78	22.11	35.24
Allahabad	19.30	18.90	21.30	20.50	20.10	22.10	29.30	26.20	42.70	29.76	28.68	33.99
Bahraich	11.60	11.70	11.20	15.10	14.40	28.80	28.30	26.80	52.40	24.44	23.32	39.18
Gonda	10.40	10.40	10.50	11.00	10.10	28.50	23.10	21.00	59.50	26.09	25.53	33.17
Barabanki	12.20	14.20	-15.50	15.60	14.70	34.10	21.80	17.70	88.90	21.75	21.24	26.89
Faizabad	10.50	11.20	3.70	17.90	16.80	29.90	23.60	21.70	41.80	25.24	24.26	33.15
Sultanpur	9.30	8.70	49.10	16.29	16.10	24.00	24.30	22.70	108.40	25.26	23.74	69.67
Siddharthnagar	10.00	10.50	-15.90	13.60	12.40	96.10	19.90	17.10	128.30	23.88	23.20	46.39
Maharajganj	14.60	14.80	12.40	18.40	17.70	28.20	24.90	21.30	67.40	25.69	23.57	87.85
Basti	10.00	10.50	-15.90	13.60	12.40	96.10	19.90	17.10	128.30	25.33	24.78	33.99
Gorakhpur	14.60	14.80	12.40	18.40	17.70	28.20	24.90	21.30	67.40	23.70	18.14	56.42
Deoria	13.00	14.20	-20.90	18.40	17.80	44.30	24.30	19.60	179.10	26.84	25.87	40.56
Mau	14.30	14.70	6.50	18.70	18.10	29.30	24.00	18.80	119.00	25.98	21.51	53.19
Azamgarh	14.30	14.70	6.50	18.70	18.10	29.30	24.00	18.80	119.00	25.30	24.59	35.38
Jaunpur	14.00	14.30	8.60	16.10	15.00	36.20	6.30	25.70	35.60	26.62	26.30	31.06
Ballia	12.10	18.90	-54.80	18.20	17.20	44.80	22.40	16.60	143.10	21.60	20.99	27.33
Ghazipur	15.80	25.60	-63.90	15.90	14.60	52.80	27.00	22.40	123.60	26.65	27.64	15.14
Varanasi	19.40	15.80	33.10	20.60	17.90	29.60	29.80	26.70	38.80	30.77	30.19	32.34
Mirzapur	22.80	22.40	25.80	23.60	22.90	29.00	32.30	30.70	44.40	31.75	31.64	32.47
Sonbhadra	22.80	22.40	25.80	23.60	22.90	29.00	32.30	30.70	44.40	37.37	35.32	52.11
Uttar Pradesh	16.66	17.70	9.70	19.78	18.20	30.70	25.49	19.80	61.22	25.41	22.44	38.97

Source - Census of India, Uttar Pradesh, 1961, 1971, 1981 and 1991.
The data of some of the districts were not available, they had been adjusted from the previous records and the data of adjacent districts.

N.U.P. - Not Urban Population

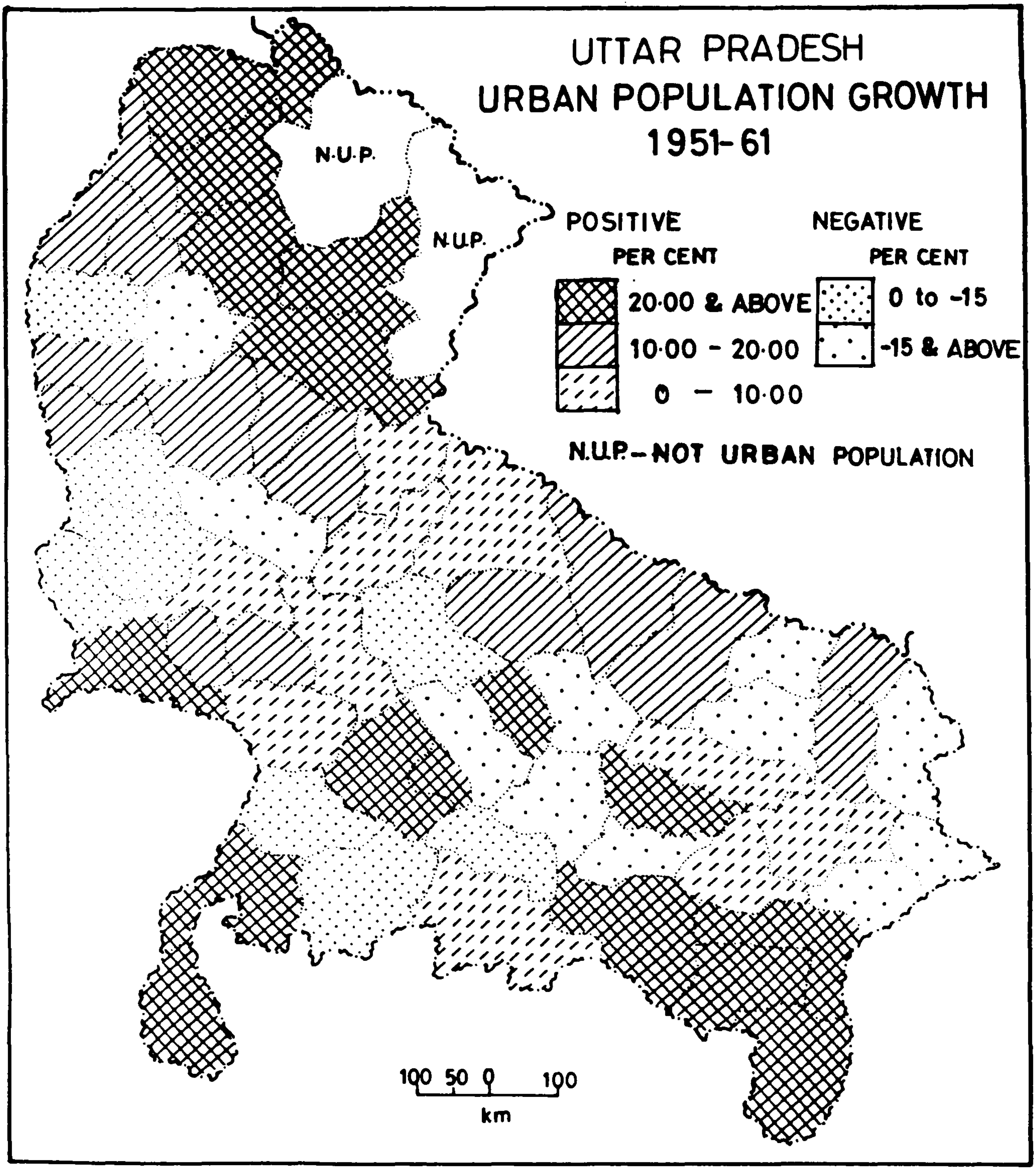

UTTAR PRADESH
URBAN POPULATION GROWTH
1951-61
N.U.P.
N.U.P.
POSITIVE
PER CENT
20.00 & ABOVE
10.00 - 20.00
0 - 10.00
NEGATIVE
PER CENT
0 to -15
-15 & ABOVE
N.U.P.-NOT URBAN POPULATION
100 50 0 100
km

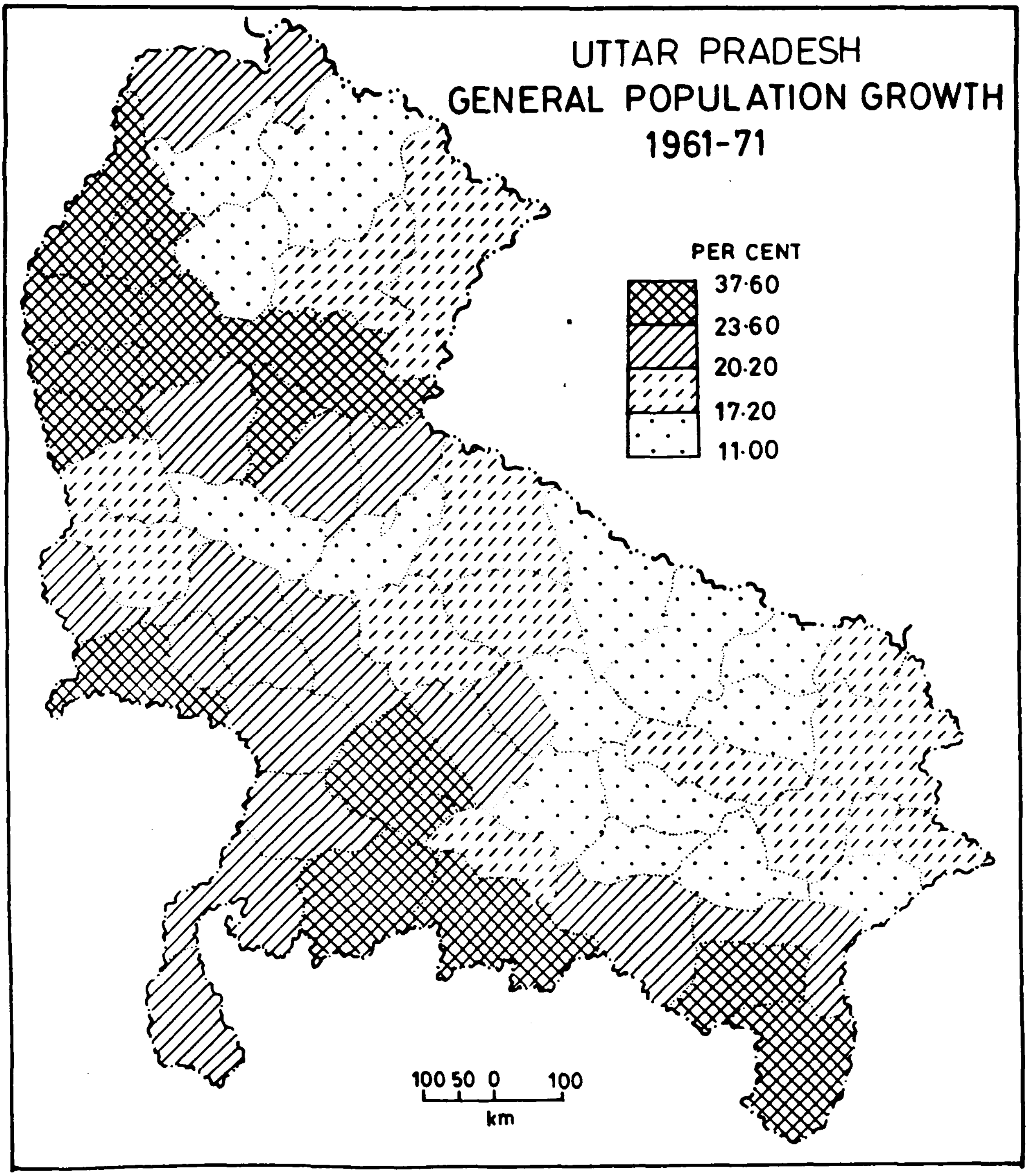
FIG.06

population, which is conspicuous for very high disparity in growth rate between positive and negative. These districts constitute four small patches lying in the different parts of the state (Fig. 06). Figure gives a plausible explanation.

Population Growth 1961-71

General Distribution

The growth of population in the state has by no means been uniformly distributed among the districts. During the decade 1961-71 the growth rates varied form 37.60 per cent recorded in Nainital to 11.00 per cent registered in Gonda. Within this wide range of variation as many as forty-six per cent districts of the state recorded growth rates less than the state average of 19.78 per cent. The districtwise distribution of population growth rates with the help of quartile technique may be arranged into four grades of 11.00 to 17.20 per cent, 17.20 to 20.20 per cent, 20.20 to 23.60 per cent and 23.60 to 37.60 per cent. The distribution of growth rate of population by districts shows that about half of the districts of high to very high rates of population growth (23.60 to 37.60 per cent) form a prominent region in northwestern part of the state. A discontinuous region of the similar grade lies in the southern part to comprise the districts of Kanpur Dehat



UTTAR PRADESH
GENERAL POPULATION GROWTH
1961-71
PER CENT
37·60
23·60
20·20
17·20
11·00
100 50 0 100
km

FIG. 07

(25.80 per cent), Kanpur Nagar (25.80 per cent), Hamirpur (24.40 per cent), Banda (24.00 per cent), Mirzapur and Sonbhadra (23.60 per cent). A continuous region of median to high (20.20-23.60 per cent) growth rates is found in the western half of the state. Only two districts of Allahabad and Varanasi are away from this zone. Fig.07 shows that two regions of median to low rates 20.20 - 17.20 per cent) separated by a continuous region of low to very low growth rates are found in the eastern half of the state. Remaining districts of this slab are scattered over the west plain and the Himalayan zone. This may be attributed to the lack of development and out-migration from these areas.

In the majority of the districts, however, the growth rates are very close to the state average. Broadly speaking the growth rates have been generally high in the western and southern parts and low in the eastern part of the state.[18]

Rural/Urban Distribution

Rural and urban population differ considerably in respect of growth rates and their distribution. The growth rates of rural population vary from a maximum of 33.10 per cent in Nainital to a minimum of 10.10 per cent in Gonda (Table 04). Though the interdistrict variation in the growth rates of rural and urban population is relatively more significant and notable. The districtwise rural growth rates

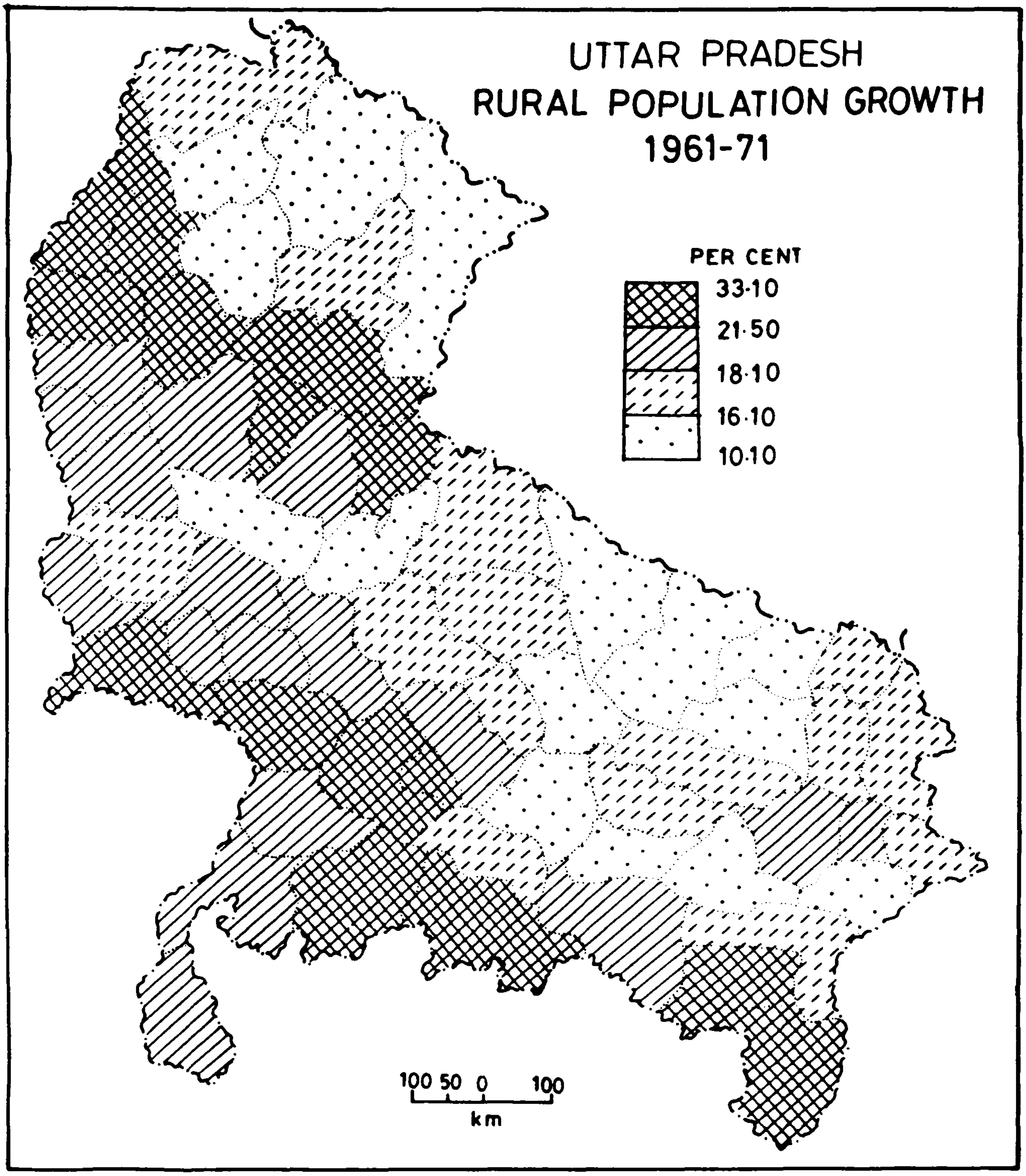

UTTAR PRADESH
RURAL POPULATION GROWTH
1961-71
PER CENT
33·10
21·50
18·10
16·10
10·10
100 50 0 100
km

FIG.08

are arranged into quartiles of very high to high (33.10-21.50 per cent), high to median (21.50-18.10 per cent), median to low (18.10-16.10 per cent) and low to very low (16.10-10.10 per cent). The graded distribution of population growth in rural population, as depicted in Fig.08, identifies two distinct regions of very high to high (33.10-21.50 per cent) growth rates. One lies in the northwestern part of the state and comprises the districts of Dehradun, Hardwar, Saharanpur, Muzaffarnagar, Bijnor, Rampur, Nainital and Pilibhit, and other in the southwestern part of the area to include the districts of Agra, Etawah, Kanpur Nagar, Kanpur Dehat, Hamirpur and Banda. A narrow interrupted belt of median to high (18.10 - 21.50 per cent) growth rates is found to include western districts of west plain, south-western districts of the plateau region and southwestern and the southern districts of central plain. The median to low growth rate districts form two regions - one lies in the eastern part and the other in the central part. These two regions are separated by a continuous zone of low to very low (16.10-10.10 per cent) growth rates. It stretches from Bahraich in the northwest to Rae Bareili in the south and Ghazipur in the east. The other region of same slab comprises half of the districts of the Himalayan zone, namely, Tehri Garhwal, Garwal, Chamoli and Pithoragarh. Generally the high growth rates of rural population are found in those areas which are agriculturally more productive.[19]

Urban growth rates of population vary very widely among the districts during 1961-71 decade. It ranges from 15.70 per cent in Sitapur to 124.90 per cent in Uttar Kashi. The average rate of growth of urban population in the state works to 30.70 per cent. It will be seen from Fig. 09 that the districts of high to very high (39.25-124.90 per cent) growth rates are mainly found in the southern and eastern margins of the state. They constitute two small regions: one lies in the southern part and comprises the districts of Fatehpur, Hamirpur and Banda, and the second in the extreme eastern part of the state to include the districts of Deoria, Ballia and Ghazipur. Other districts are scattered over the plains and the Himalayan zone. The median to high (29.80-39.25 per cent) grade of the districts form a discontinuous region over the plains, but a distinct region of this grade is also identified in western part of the state (Fig. 09). A prominent region of low to very low (26.60-15.70 per cent) growth rates of urban population lies in the west plain to include eight districts of Rampur, Bareilly, Pilibhit, Shahjahanpur, Farrukhabad, Etah, Agra and Mathura.

It may be inferred that in Uttar Pradesh more people are outmigrant than inmigrant. This is perhaps on account of pressure on land and inadequate industrial employment in the state. Net growth rate for the decade 1961-71 is the

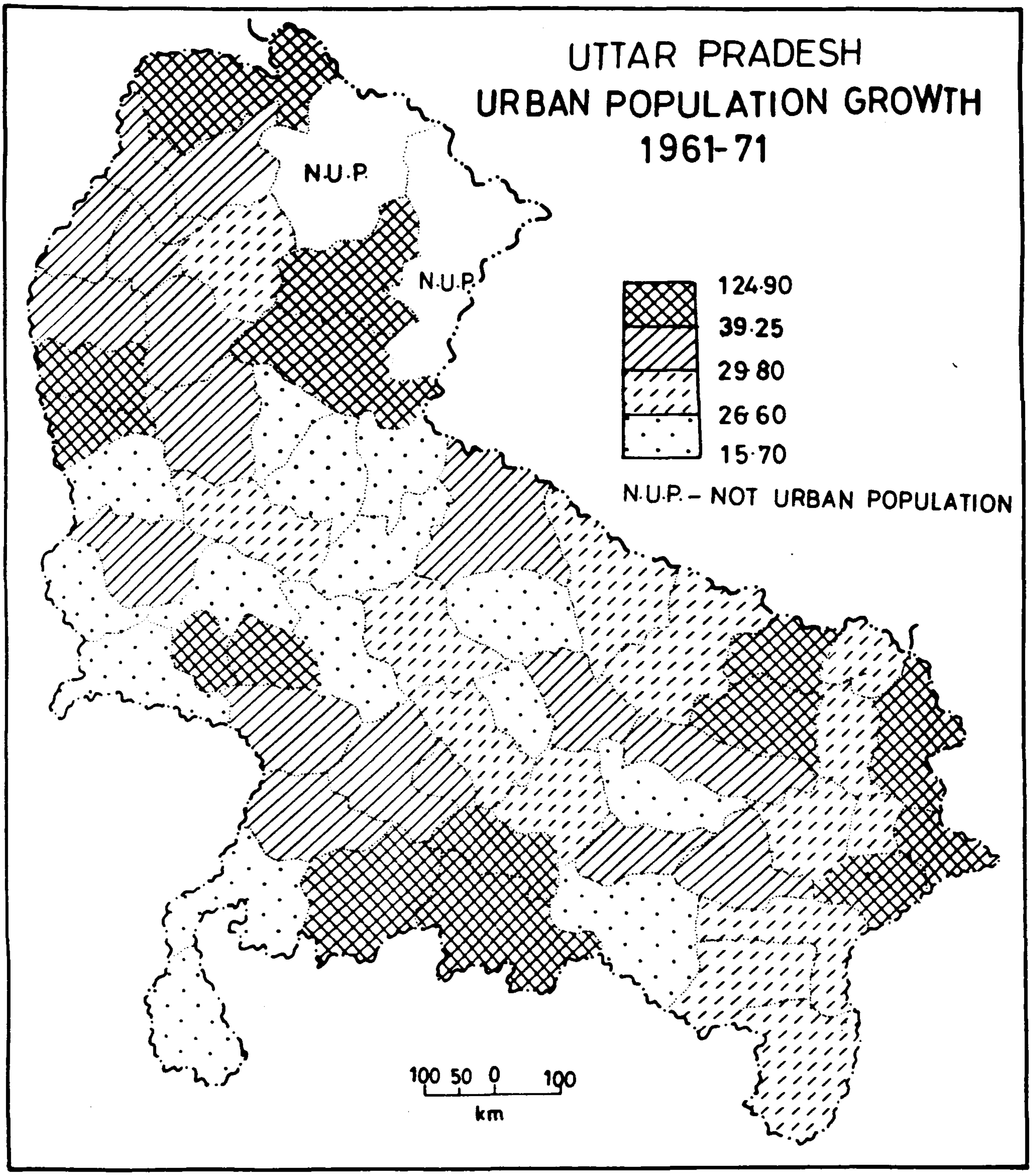

UTTAR PRADESH
URBAN POPULATION GROWTH
1961-71
N.U.P.
N.U.P.
124.90
39.25
29.80
26.60
15.70
N.U.P. - NOT URBAN POPULATION
100 50 0 100
km

FIG. 09

result of all three factors of births, deaths and migrations.[20]

Population Growth 1971-81

General Distribution

Average growth rate of population in the state is 25.40 per cent during the decade 1971-81, which is about 5.71 per cent points high over the preceding decade. The interdistrict variations are from 15.30 per cent to 43.90 per cent (Table 04). The distribution of population growth rates is arranged into quartiles of 15.30 to 22.40 per cent (very low to low), 22.40 to 24.90 per cent (low to median), 24.90 to 29.30 per cent (median to high) and 29.30 to 43.90 per cent (high to very high). Fig.10 shows that the south-eastern districts and the northeastern districts of mainly the west plain form two distinct regions of high to very high rates of population growth. The former region comprises the districts of Ghaziabad (37.10 per cent), Moradabad (29.70 per cent), Bijnor (30.10 per cent), Saharanpur and Hardwar (30.10 per cent), Rampur (30.80 per cent), Kheri (31.40 per cent), Pilibhit (34.10 per cent), Nainital (43.90 per cent) and Dehradun (31.90 per cent), and the latter includes the districts of Banda (29.80 per cent), Allahabad (29.30 per cent), Varanasi (29.80 per cent), Mirzapur and Sonbhadra (32.30 per cent). The districts which

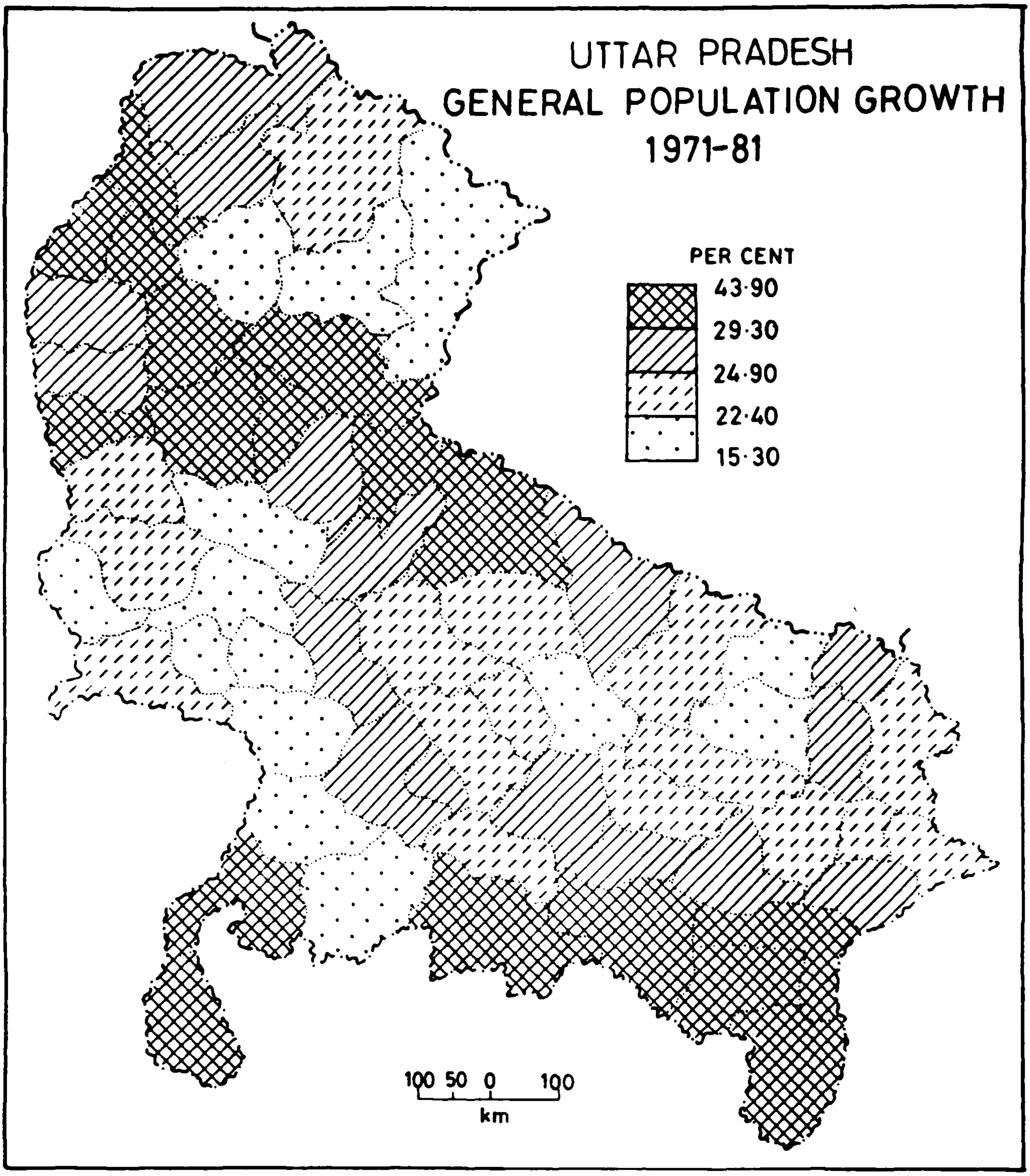

UTTAR PRADESH
GENERAL POPULATION GROWTH
1971-81
PER CENT
43·90
29·30
24·90
22·40
15·30
100 50 0 100
km

FIG.10

lie in the north and the west of the latter zone form a continuous narrow belt of median to high growth rates of 24.90 to 29.30 per cent. In the north of median to high growth rate region a dominant discontinuous region of median to low rates of population growth is identified. This discontinuity is caused by Barabanki, a district of low to very low slab. Other districts of Bulandshahr (24.70 per cent), Aligarh (22.40 per cent), Agra (23.60 per cent) and Chamoli (24.50 per cent) of the same slab are scattered over the state. A continuous belt of low to very low (22.40 to 15.30 per cent) growth rates is vertically identified in the western half of the state. The small region of this slab is found in the Himalayan zone which comprises three districts of Garhwal, Almora and Pithoragarh.

It may be pointed out that the large variation in growth rates of population are generally caused by inter-district migration.[21] The very high growth rate may be the result of high birth rate, whereas the low growth may be due to the satisfactory performance of family welfare programme, high literacy rate and relatively high rates of out-migration.

Rural/Urban Distribution

The break-up of population growth during the decade 1971-81 in terms of rural and urban varies respectively from 10.80 to 34.00 per cent and from 28.60 to 225.70 per cent.

The respective averages for the state are 19.80 and 61.22 per cent. The regional distribution of population growth in rural areas is very similar to that of total population. Two dominant regions are formed under the high to very high grade of population growth (24.00 - 34.00 per cent) : one discontinuous region interrupted by Bijnor district stretches from northwestern part to northeastern part of the state (Fig.11) and the other in the southeastern part of the state and comprises the districts of Banda (24.80 per cent), Allahabad (26.20 per cent), Janupur (25.70 per cent), Varanasi (26.70 per cent), Mirzapur and Sonbhadra (30.70 per cent). Under high to median grade of rural population growth rates (24.00 - 19.60 per cent), six districts of central plain and four districts of east plain lay in the central and eastern part of the state, constitute a discontinuous region interrupted by Basti and Ballia. They are Sitapur (20.30 per cent), Lucknow (20.20 per cent), Rae Bareli (19.80 per cent), Pratapgarh (22.60 per cent), Sultanpur (22.70 per cent), Faizabad (21.70 per cent), Gonda (21.00 per cent), Maharajganj (21.30 per cent), Gorakhpur (21.30 per cent), Deoria (19.60 per cent) and Ghazipur (22.40 per cent). Two distinct regions of median to low (19.60 - 16.00 per cent) grade of population growth are identified : one in the central part and the other in the eastern part of the state. Former comprises the

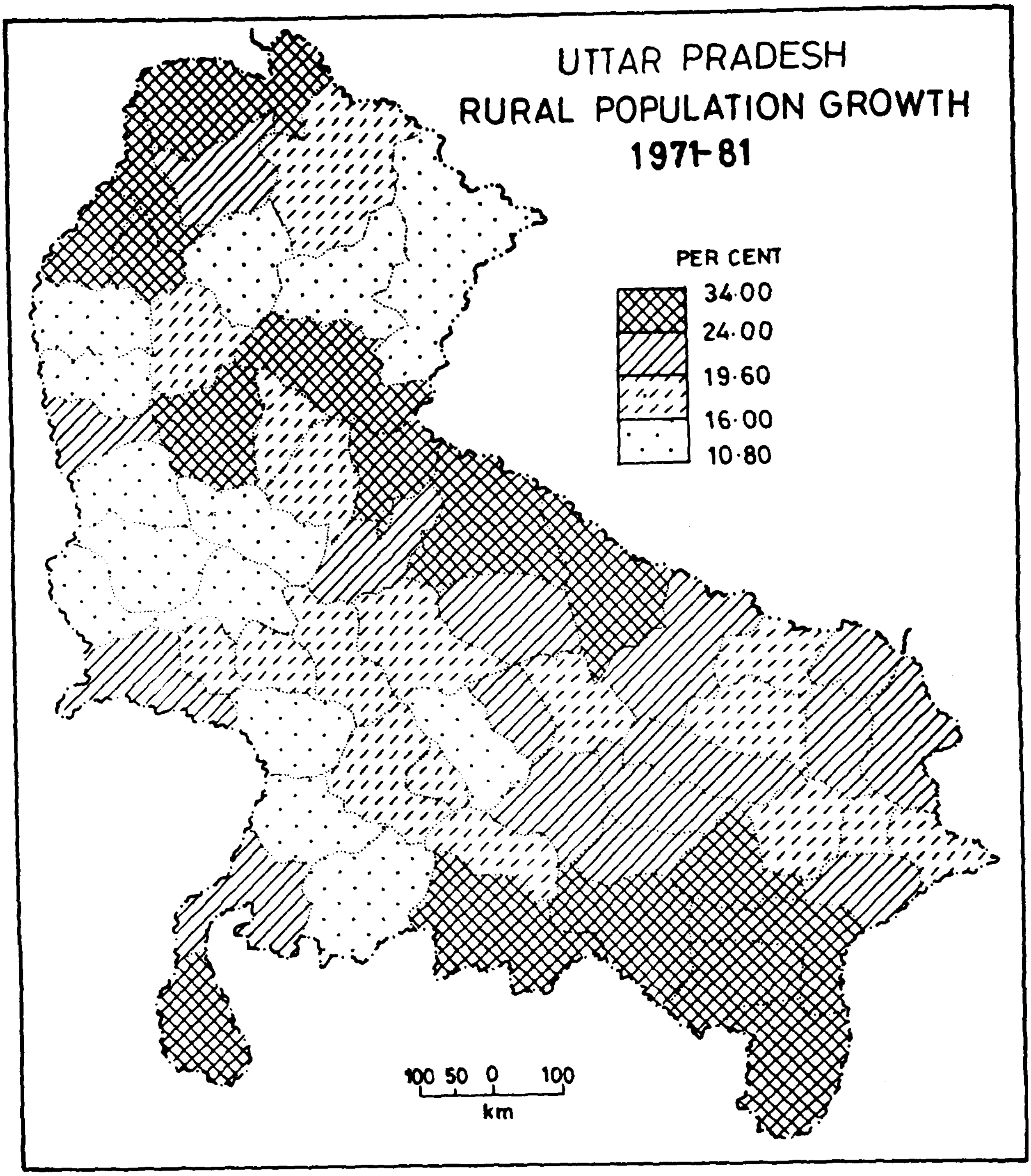

UTTAR PRADESH
RURAL POPULATION GROWTH
1971-81
PER CENT
34·00
24·00
19·60
16·00
10·80
100 50 0 100
km

FIG.11

districts of Firozabad, Mainpuri, Farrukhabad, Hardoi, Kanpur Nagar, Kanpur Dehat and Fatehpur, and the latter comprises the districts of Siddharthnagar, Basti, Azamgarh, Mau and Ballia. Under the low to very low grade of rural population growth rates (16.00 - 10.80 per cent) a single discontinuous region interrupted by Ghaziabad and Agra which is falling in the high to median slab, is found on the southwestern margin of the state (Fig. 11). Three districts of the same grade constitute a region of small size in the Himalayan zone. They, in descending order of their rural population growth, are Almora (15.60 per cent), Pithoragarh (14.60 per cent) and Garhwal (11.00 per cent).

Interdistrict distribution of urban population growth rates within the range of 28.60 to 225.70 per cent with the minimum in Agra and the maximum in Pratapgarh. It will be seen that even the urban population growth rate of the state is more than the rural population growth rate. however, the range of variations is very extensive. The patterns of urban population growth may be arranged into four grades by quartiles technique as shown in Fig. 12. The principal feature revealed by this graded distribution is that under high to very high rates of population growth (102.50-225.70 per cent) a distinct region is formed in the eastern part of the state (Fig. 12). Other region though of small size lying under this slab is located in the Himalayan

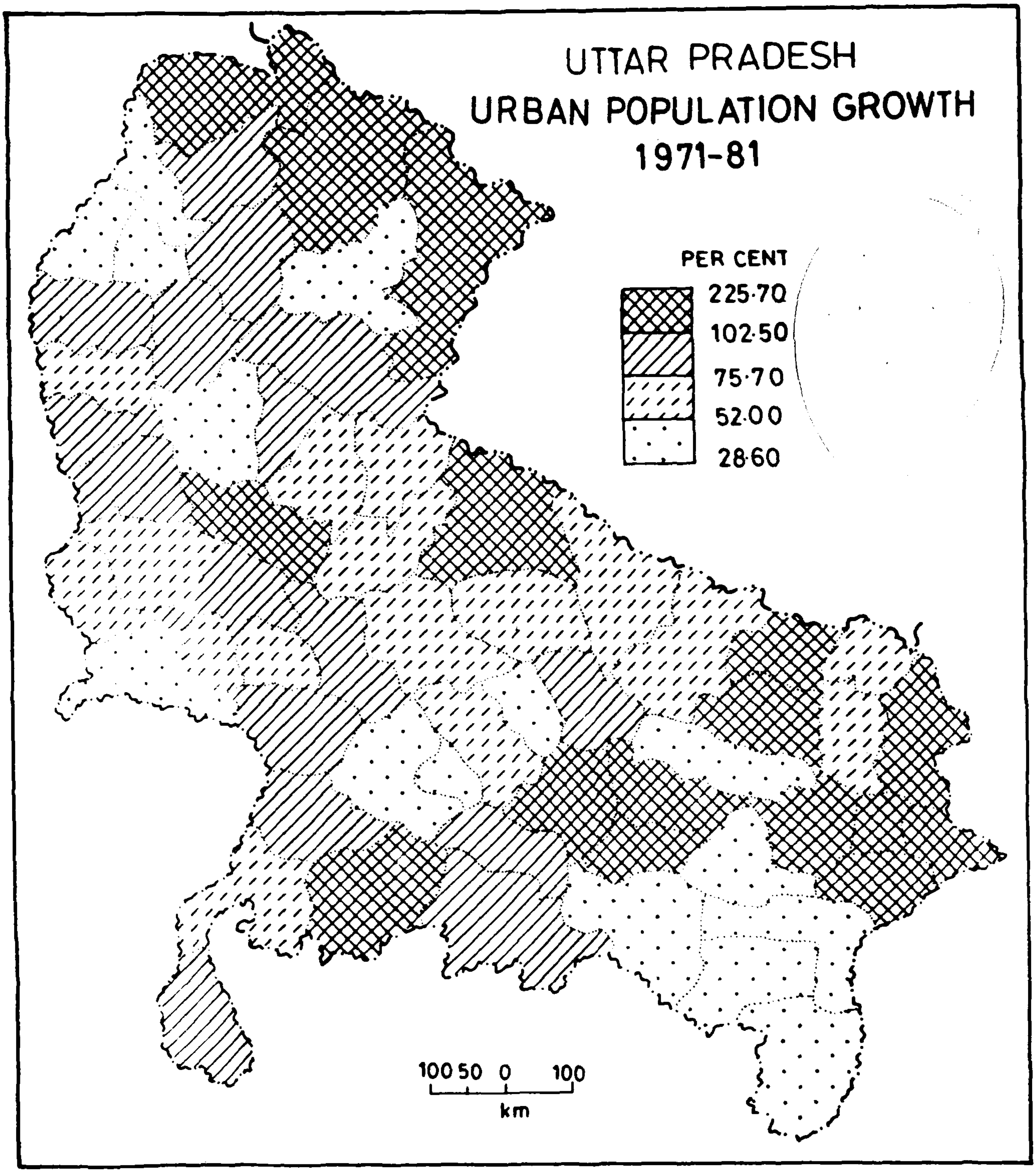

UTTAR PRADESH
URBAN POPULATION GROWTH
1971-81
PER CENT
225·70
102·50
75·70
52·00
28·60
100 50 0 100
km

FIG. 12

section and comprises only three districts of Uttar Kashi (120.50 per cent), Chamoli (139.00 per cent) and Pithoragarh (126.30 per cent). Two distinct regions falling under the median to high grade (75.70-102.50 per cent) of urban population growth are found in the western half of the state. One lies in the northern part of the state and is composed of Tehri Garhwal, Garhwal, Nainital, Rampur, Bijnor and Muzaffarnagar districts, and other is in the southwestern part of the state. Remaining districts of this slab are scattered over southern, central and western parts of the state. Under median to low grade (75.70-52.00 per cent) of urban population growth, a prominent region is observed to include west, central and east plain districts. They are Bareilly, Pilibhit, Shahjahanpur, Hardoi, Unnao, Sitapur, Bahraich and Gonda. The southeastern districts of the state form a compact region of low to very low rates of urban population growth. It includes the districts of Allahabad (42.70 per cent), Jaunpur (35.60 per cent), Varanasi (38.80 per cent), Mirzapur and Sonbhadra (44.40 per cent). Dehradun, Hardwar and Saharanpur districts of the same grade constitute a small region in the extreme north-western part of the state (Fig. 12).

The high and stationary growth rate in urban population may be the result of continuous migration of people from villages. Due to migration to urban areas most of the more urbanized districts have grown faster than the less urbanized. State has comparatively low levels of urbanization. There is a considerable interdistrict variation in the levels of urbanization.[22]

Population Growth 1981-91

General Distribution

The interdistrict distribution of population growth during the decade 1981-91 varies from 49.48 per cent in Ghaziabad to 5.79 per cent in Garhwal district. The second highest district is Nainital (39.49 per cent) which records about 10 per cent points population growth rate, less than that of the highest one i.e., Ghaziabad (Fig.13 and Table 04). The distribution of population growth among the districts may be arranged into quartiles of 5.79 to 21.75 per cent, 21.75 to 24.12 per cent, 24.12 to 26.84 per cent and 26.84 to 49.48 per cent. The districts of high to very high population growth rates (26.84 - 49.49 per cent) are scattered over the state. But the majority of the districts are concentrated in the northwestern and southeastern parts of the state where they delimit small but identifiable regions (Fig. 14). About half of the districts of high to median (26.84-24.12 per cent) rates of population growth forms a distinct region in eastern part of the state. It includes Bahraich (24.44 per cent), Gonda (26.09 per cent), Faizabad (25.24 per cent), Sultanpur (25.26 per cent),

UTTAR PRADESH
COMPARATIVE POPULATION GROWTH RATE
(1981 - 91)

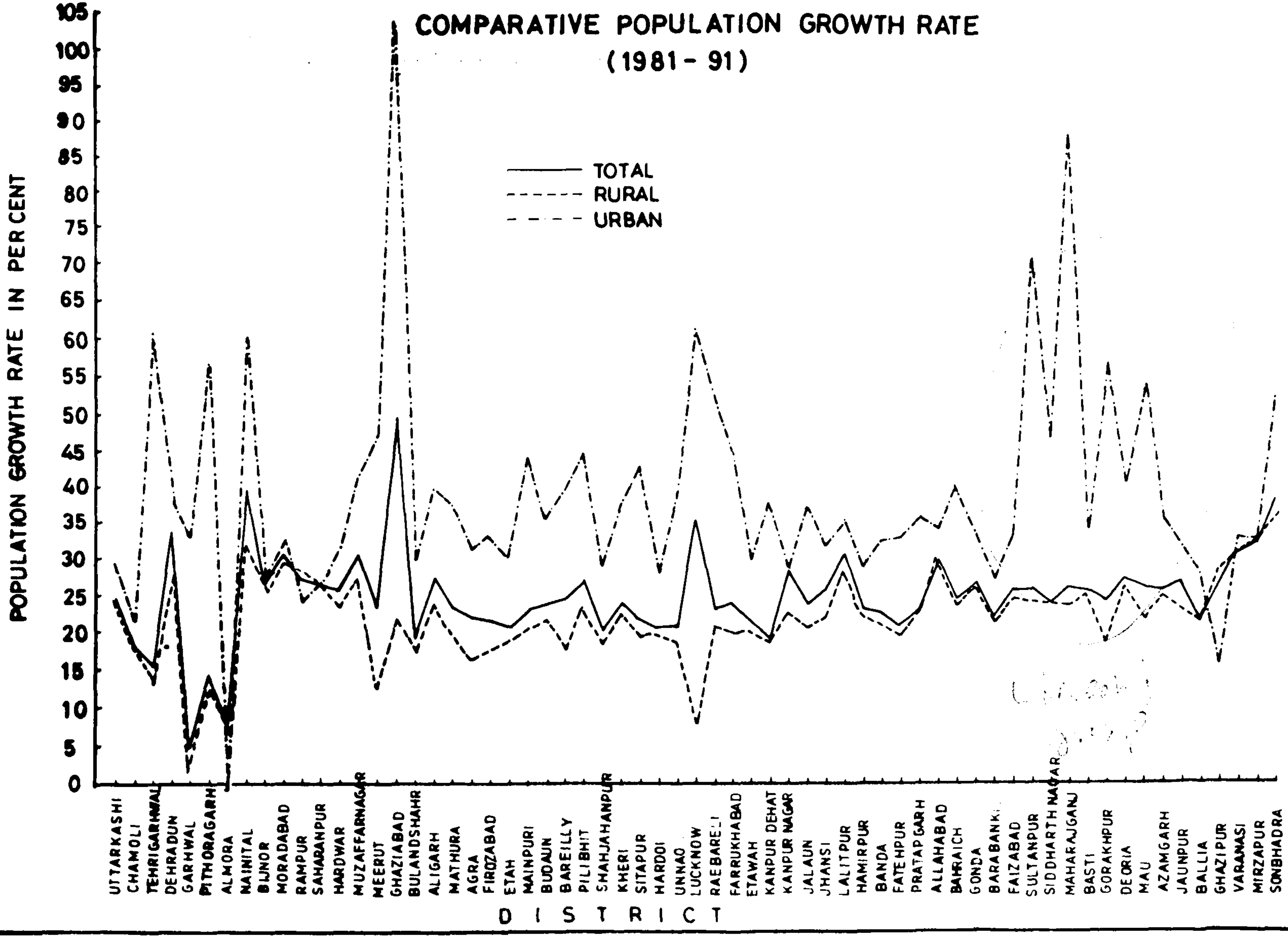


FIG.13

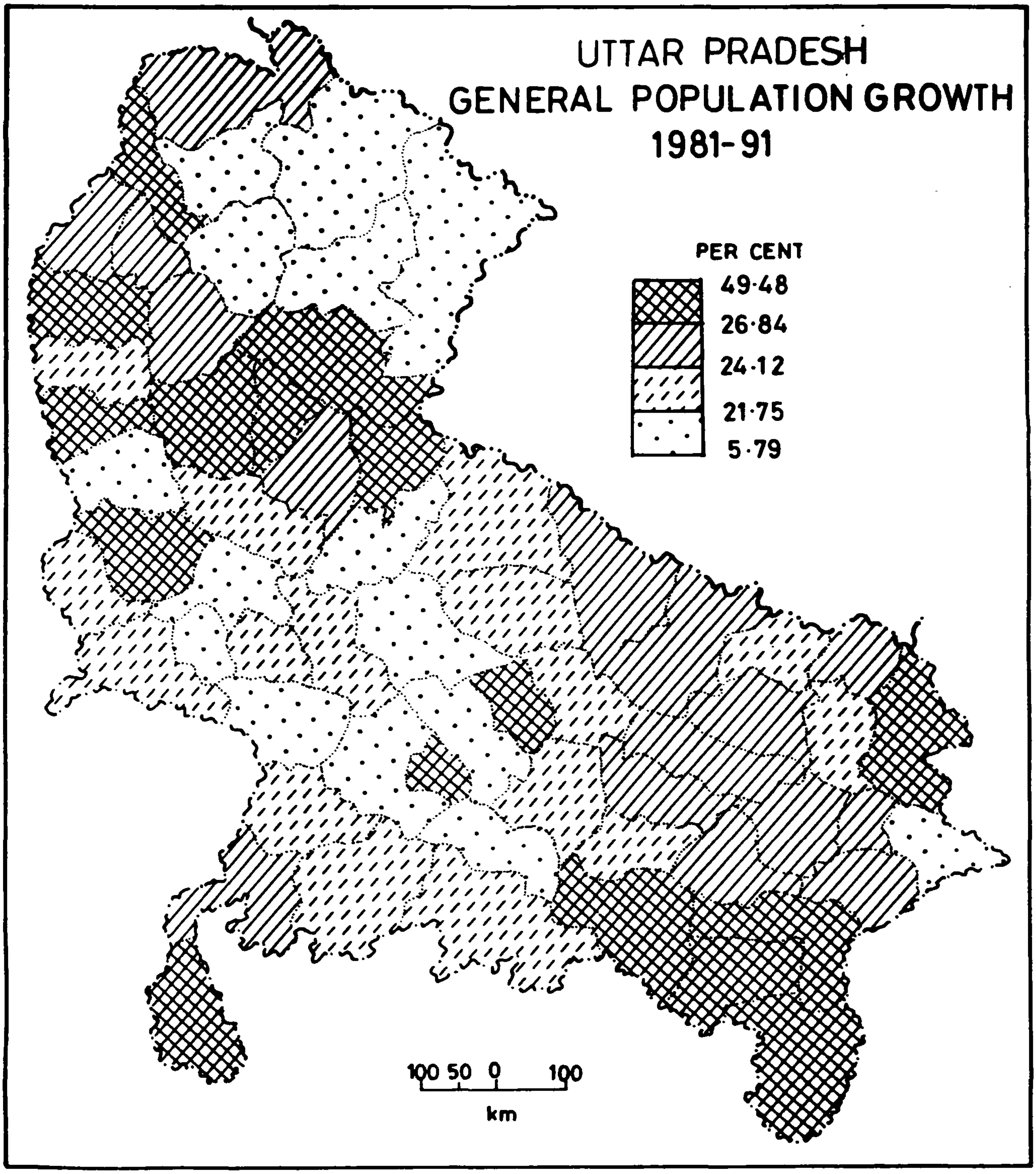

UTTAR PRADESH
GENERAL POPULATION GROWTH
1981-91
PER CENT
49·48
26·84
24·12
21·75
5·79
100 50 0 100
km

FIG.14

Basti (25.33 per cent), Maharajganj (25.69 per cent), Mau (25.98 per cent), Azamgarh (25.30 per cent), Ghazipur (26.65 per cent) and Jaunpur (26.62 per cent). A very small region composed of three districts of Bijnor, Hardwar and Saharanpur is found in the extreme northwestern part. In the central part of the state a vertical belt of median to low (24.12-21.75 per cent) slab is found to be a discontinuous dominant region. This belt is separated by a zone of low to very low population growth rates found in the central part. Two regions of low to very low (21.75 - 5.79 per cent) population growth rates are identified. One which comprises about half of the districts of this slab, lies in the western half of the state. The other lies in the Himalayan zone which is composed of five districts of Tehri Garhwal (15.60 per cent), Garhwal (5.79 per cent), Almora (8.38 per cent), Chamoli (18.21 per cent) and Pithoragarh (14.55 per cent). It is to note that such an area of agricultural potentialities remained thinly settled till recently in spite of heavy pressure of population in other parts of the Ganga plain of which it is a part. It is the migrant farm population from outside - mostly from Punjab - which has largely been instrumental in settling it in recent decades.[23]

It may be pointed out that the concentration of population is due to the availability of natural resources as well as economic resources. It is related to the continuing acceleration in the process of urbanization, and expanding infrastructural facilities. Thus, the rapid growth of population is attributed to the in-migration resulting from the development of manufacturing industries, mining, trade, etc., all to accelerate the process of urbanization, and the development of irrigation and reclamation of land brought out by increased intensity and extension in farming.[24] Very low rates of population growth districts are associated with the low degree of urbanization and industrialization, with the decline in birth rate and out-migration caused by pressure of population and paucity of resources. The moderate growth of population is attributed to the migration of landless labour to other states, such as Punjab, Delhi and Haryana and to the major break through in mortality rates and high birth rates which are associated with early marriage and backwardness.[25]

Rural/Urban Distribution

The growth of rural population during 1981-91 varies from 35.32 per cent in Sonbhadra to 2.89 per cent in Garhwal district, whereas the state average accounts for 22.44 per cent (Table 04). Fig. 15 shows that thirteen districts of high to very high (25.33-35.32 per cent) growth rates out of sixteen identify two zones. One lies in the northwestern part to include Himalayan districts of Nainital (31.76

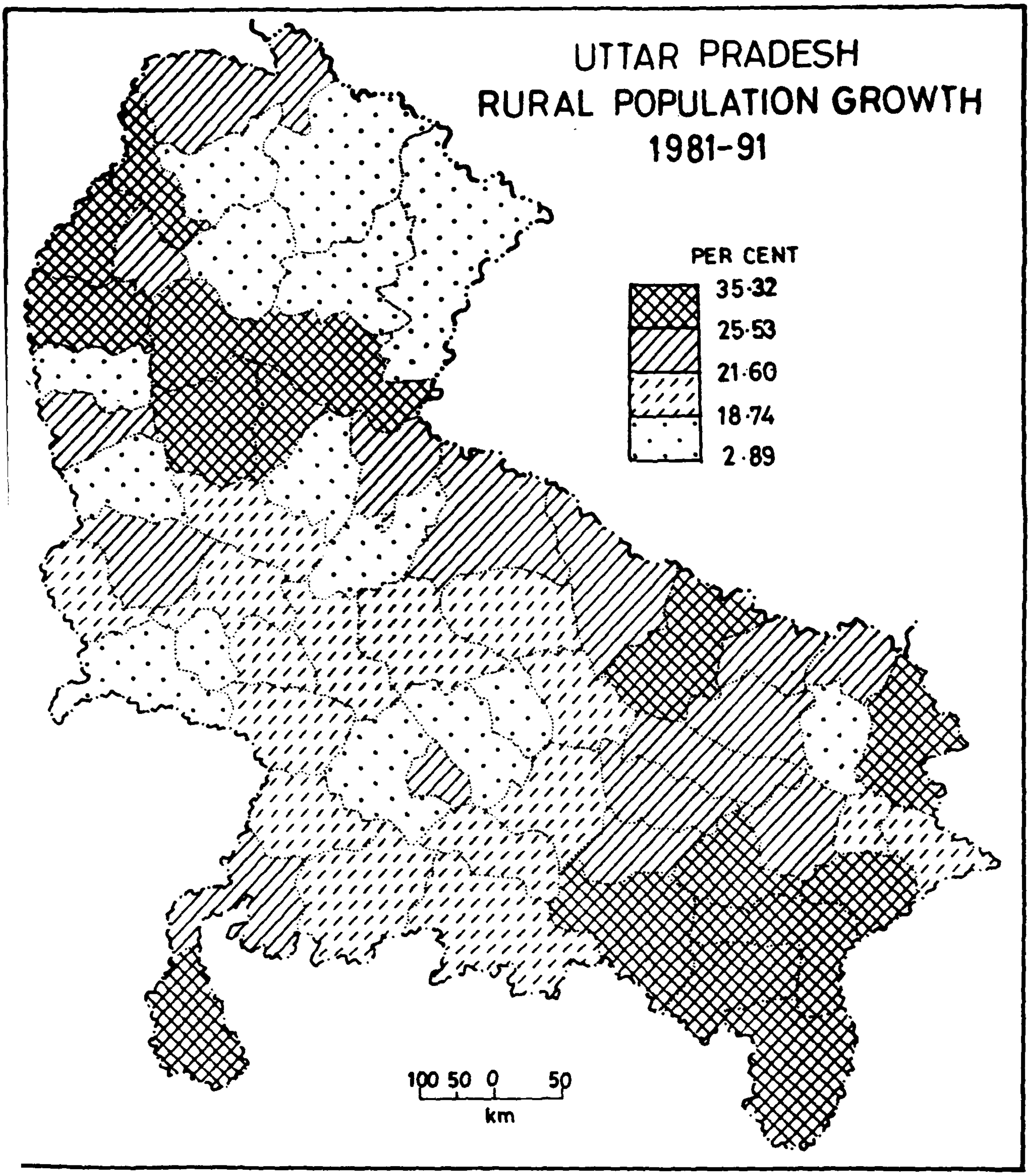

UTTAR PRADESH
RURAL POPULATION GROWTH
1981-91
PER CENT
35·32
25·53
21·60
18·74
2·89
100 50 0 50
km

FIG.15

per cent) and Dehradun (28.47 per cent) and five districts - Rampur (28.15 per cent), Moradabad (29.41 per cent), Bijnor (26.48 per cent), Muzaffarnagar (27.11 per cent) and Saharanpur (26.18 per cent) of west plain. The other lies in the southeastern part and comprises six districts of Allahabad (28.68 per cent), Jaunpur (26.31 per cent), Varanasi (30.19 per cent), Ghazipur (27.64 per cent), Mirzapur (31.64 per cent) and Sonbhadra (35.32 per cent). A dominant region of median to high rates of population growth is identified in northern and eastern parts which comprise two-thirds districts of this grade. Some southern, central and western districts combinedly constitute a single prominent region of median to low (21.60-18.74 per cent) rural population growth. Only two districts (Ballia and Mau) of this slab are located in the extreme eastern part of the state. A small zone of low to very low rates of population growth comprised of Kanpur Dehat, Unnao and Lucknow is found in the central part. The other region of the bottom slab is found in the Himalayan zone. It comprises five districts of Chamoli, Pithoragarh, Almora, Garhwal and Tehri Garhwal.

It may be noted that southeastern districts have relatively high pressure of population on rural lands and infact not much industrial development has taken place there.[26] Consequently a large surplus of rural workforce migrates to the industrial areas of Maharashtra, Delhi, West Bengal, Punjab etc.[27] In the northwestern region of the country, the outflows from rural to urban is relatively more from Uttar Pradesh to Delhi and Punjab but a significant proportion of population from Uttar Pradesh goes to Maharashtra, Madhya Pradesh etc.[28] They are labourers.[29] Generally, the high growth rates of rural population are found in these areas which are agriculturally more productive.[30]

The growth rate of urban population differs widely among the districts, it ranges from -0.34 per cent to 103.31 per cent. Ghaziabad records the highest urban growth of population (103.31 per cent) and Almora is at the bottom with exceptionally negative growth rate (-0.34 per cent). The average urban population growth for the state works to be 38.97 per cent (Table 04). The distribution of urban population growth among the districts appears to follow a pattern which is characterized by an urban concentration of high to very high (44.15-103.31 per cent) in the north-eastern, central and eastern parts of the state (Fig.16). Two distinct regions form under the median to high (35.24-44.15 per cent) growth rates. One lies in the west plain and comprises the four districts of Bareilly (39.48 per cent), Budaun (35.54 per cent), Aligarh (39.87 per cent) and Mathura (37.36 per cent). Other is found to be discontinuous region interrupted by Hardoi in central plain and Jhansi in plateau region, which varies from Tarai belt to extremely

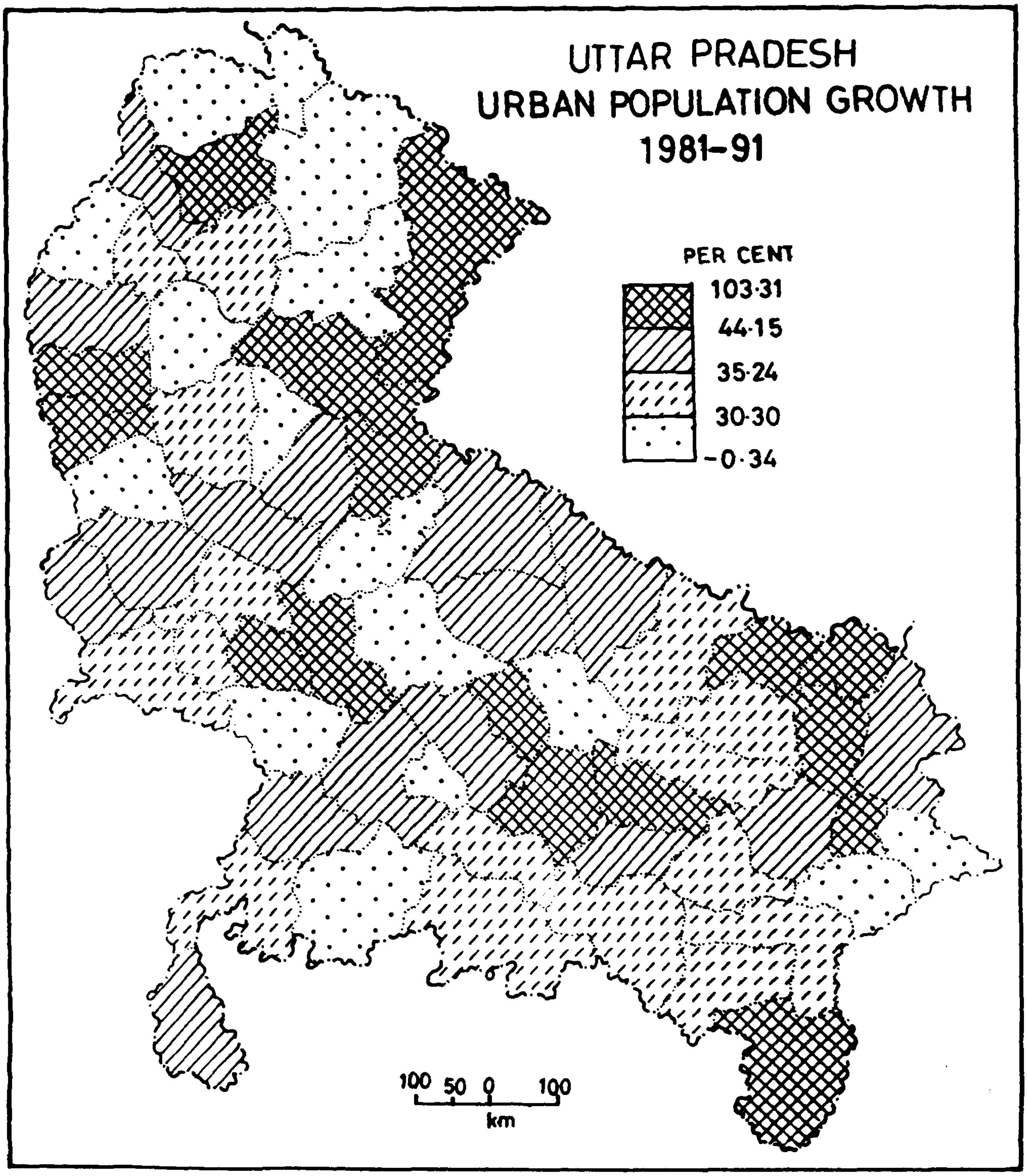

UTTAR PRADESH
URBAN POPULATION GROWTH
1981-91
PER CENT
103·31
44·15
35·24
30·30
-0·34
100 50 0 100
km

FIG.16

southern margin of the state and includes forty-eight per cent districts of this grade. These districts against their growth rates of urban population are Kheri (37.43 per cent), Bahraich (39.18 per cent), Sitapur (42.43 per cent), Unnao (38.46 per cent), Kanpur Dehat (36.98 per cent), Jalaun (36.98 per cent) and Lalitpur (37.10 per cent). One prominent discontinuous region is delimited under the grade of median to low (35.24-30.30 per cent) growth rates of urban population, it is interrupted by Azamgarh district found in the eastern part of the state (Fig. 16). One small region of the similar grade is formed by three districts of Agra, Firozabad and Etah. A single small region belonging to low to very low (30.30 — -0.34 per cent) growth rates of urban population, lies in the Himalayan zone. Remaining eighty-four per cent districts lying under this slab are so scattered over the state that they fail to form any distinct region (Fig. 16).

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CHAPTER V

FERTILITY

Populations are the product of fertility, mortality and migration. The level of fertility is a key factor in determining the future size and structure of a society. Any change in the pattern of fertility implies long term changes in the age structure of a country, making differing demands on education services and housing provision and influencing the number of young workers entering the labour market or creating problems of dependency in old age.

Many countries of the developing world mention high levels of fertility whereas those of mortality has fallen, leading to the rapid population growth witnessed in the world over the past few decades. At the same time, the last few years are seen a continuous decline in fertility in the many developed countries, so that some European nations, such as Germany and U.K., are now experiencing a decline in population while others, such as Japan, have a level of fertility which is approaching or below that of replacement, although because of the age-structure of the country this has not yet led to a falling population.

The fertility, one of the most important determinants of population growth of Uttar Pradesh shows fairly notable regional variations. These variations are not to be taken as accidental. They follow a certain discernible pattern and reflect, in some measure, the accumulated impact of long continued disparities and diversities of human life. These variations reflect not only the diversities of socio-economic conditions, but when once developed, they did also act as a strong force maintaining or even accentuating these diversities and creating a number of demographic and non-demographic problems.

In order to appreciate fully more than sixty per cent significance of the fertility and its regional distribution in the state, it seems imperative to examine, with full statistical details, two main measures of the fertility (birth rate and child-woman ratio) and the patterns of their distribution in the state. For this purpose a four-pronged thrust to the whole problem is attempted. The first prong of the thrust is through an assessment of the general and residential trends of fertility of the state. The second prong of the thrust is, oriented to an analysis of regional patterns of fertility by two main measures of birth rate and child-woman ratio. The third is the identification of the fertility regions in the state. The region is based on districtwise composite rankings of fertility for four decadal year (1961-91). The high composite ranking shows high fertility and low composite ranking shows the low fertility. Finally the relationships of fertility with some selected demographic and non-demographic variables have been obtained through the application of adequate statistical techniques in order to test the hypothesis.

TRENDS OF FERTILITY

Birth Rate (1961-90)

Birth rate, i.e., the number of births per mille mid-year population in Uttar Pradesh was quite high, in 1961 since then there was considerable decrease in the birth rate till 1981 and further increased steadily in the year 1990. The birth rate was decreased by 2.61 per mille points in 1971 and 4.10 per mille points in 1981 but it increased by 1.22 per mille points in 1990. Table 05 reveals that the birth rate declined by 5.49 per mille points from 1961 to 1990. Unlike the trends of birth rate in Uttar Pradesh, the birth rate in India continuously declined during these four decadal years (Fig.17).

The trends of birth rate by residence were found to be significant. It has been observed that the accelerating declining trend of birth rate shown earlier for Uttar Pradesh was replicable for both rural and urban areas, Urban birth rate remained higher than rural birth rate throughout the period of study (1961 to 1990). During the period from

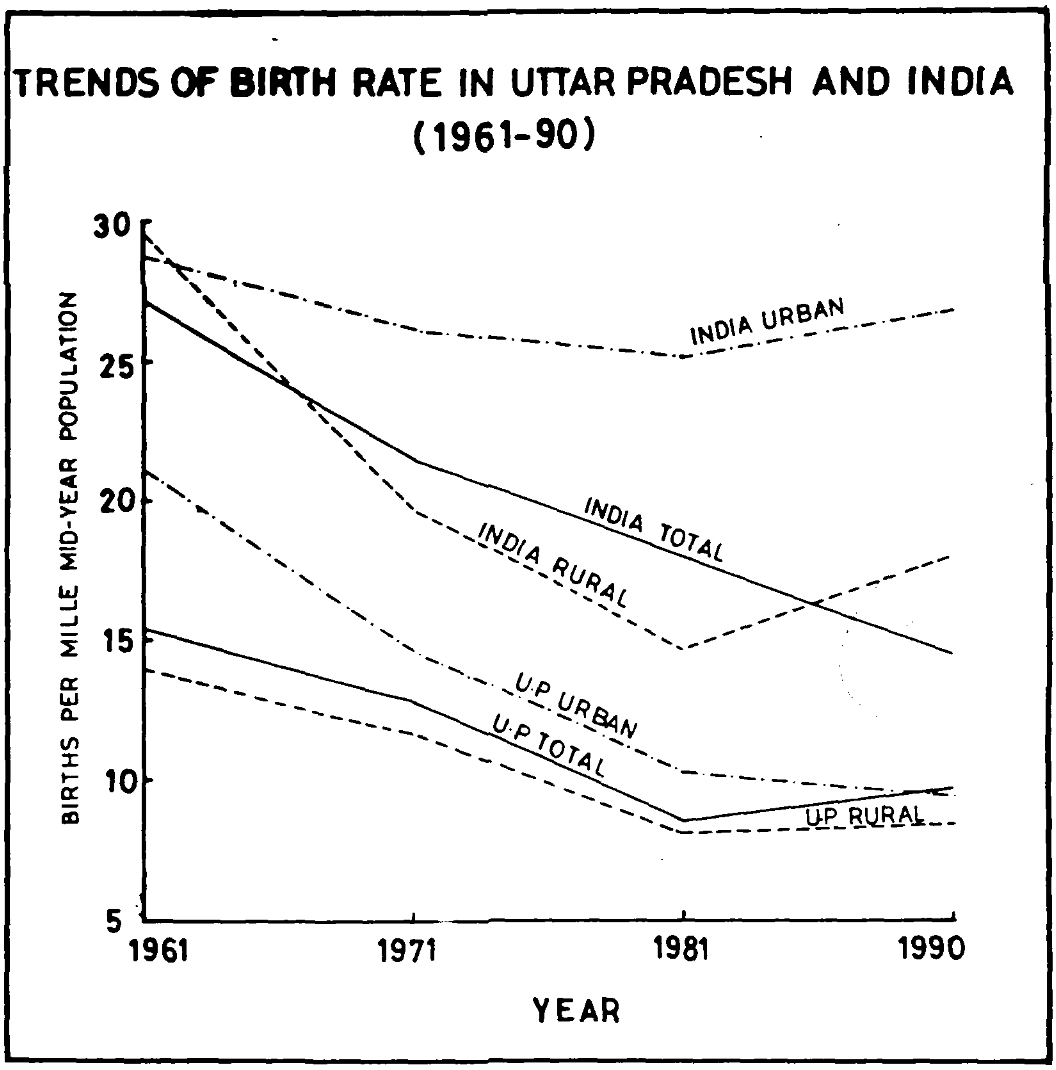

TRENDS OF BIRTH RATE IN UTTAR PRADESH AND INDIA
(1961-90)
30
25
20
15
10
5
BIRTHS PER MILLE MID-YEAR POPULATION
INDIA URBAN
INDIA TOTAL
INDIA RURAL
U.P URBAN
U.P TOTAL
U.P RURAL
1961
1971
1981
1990
YEAR

FIG-17

1961 to 1981 the rural birth rate in the state declined from 14.00 per mille to 8.16 per mille and increased by 8.50 per mille in the year 1990 in rural areas while in urban areas the birth rate has decreased steadily from 1961 to 1990 (Fig. 17). Table 05 shows that the trend of birth rate in India as a whole declined from 1961 to 1981 and increased in 1990 in both rural as well as urban areas. The birth rate decreased to 29.91 per mille in 1961, 19.90 in 1971, 14.80 in 1981 and increased to 18.00 per mille in 1990 whereas in urban areas it declined to 28.93 per mille in 1961, 26.20 per mille in 1971, 25.10 per mille in 1981 and increased to 26.70 per mille in the year 1990 (Table 05).

In rural population the illiteracy, ignorance and indifference of Chowkidar as also the members of the family where birth may have occurred caused a large gap between the actual number and those which were reported. In urban population there being better communications and more literacy among the population, registration is fairly accurate though offenders exist due to the apathy of public to get the events registered.[01]

Child-Woman Ratio (1961-91)

Since the mid-twentieth century the child-woman ratio, i.e., the number of children of 0-4 years per mille women of reproductive age-group 15-44 years, had undergone a substantial and strikingly noticeable change since 1961.

TABLE 05

TRENDS OF FERTILITY (BIRTH RATE) IN UTTAR PRADESH AND INDIA, 1961-90

(per mille)

Year	Uttar Pradesh			India		
	Total	Rural	Urban	Total	Rural	Urban
1961	15.40	14.00	21.40	27.10	29.91	28.93
1971	12.79	11.60	14.60	21.50	19.90	26.20
1981	8.69	8.16	10.27	18.00	14.80	25.10
1990	9.91	8.50	9.84	14.50	18.00	26.70

Source - Vital Statistics of India, 1961, 1971, 1981 and 1990. The unpublished data of 1990 is obtained from the Directorate of Medical and Health Services, Swasthya Bhavan, Lucknow.

This change in child-woman ratio varied from 726 in 1961 to 654 in 1991 for general population of Uttar Pradesh. A downward trend since 1961 is shown in Fig. 18. But this decline was not steady all through. Infact the periods of four decadal years had two distinct phases in Uttar Pradesh. The first was the phase of steady increase in child-woman ratio. In this period, it increased from 726 in 1961 to 752 in 1971. The second was the phase of continuous decline in child-woman ratio it was 694 in 1981 to 654 in 1991. But it tended to decline continuously in India as a whole since 1961 but the ratio was fairly lower as compared to the state average (Table 06).

The present analysis reveals that fertility rates were more closely related to the levels of socio-economic development, stable low level of fertility may be reached (voluntarily) only under certain conditions of expectation of life (particularly low infant mortality levels), female literacy income distribution, communication facilities and availability of family planning services and facilities.[02]

Differential child-woman ratio was distinctly uneven and it was in favour of rural population in the state and India as a whole (Table 06). The analysis of rural/urban trends of child-woman ratio depicted that the change in child-woman ratio had varied from 722 in 1961 to 686 in 1991 for the rural population and 749 to 620 for the urban

TABLE 06

TRENDS OF FERTILITY (CHILD-WOMAN RATIO) IN UTTAR PRADESH AND INDIA , 1961-91

(per mille)

Year	Uttar Pradesh			India		
	Total	Rural	Urban	Total	Rural	Urban
1961	726	722	749	719	730	666
1971	752	759	709	717	742	620
1981	694	711	621	599	625	522
1991	654	686	620	555	605	513

Source - Calculation is based on published data obtained from Census of India 1961, Uttar Pradesh and India, Cultural and Migration Tables ; Census of India 1971 and 1981, Uttar Pradesh and India, Social and Cultural Tables and Census of India 1991, Final Population Totals ; Brief Analysis of Primary Census Abstract.

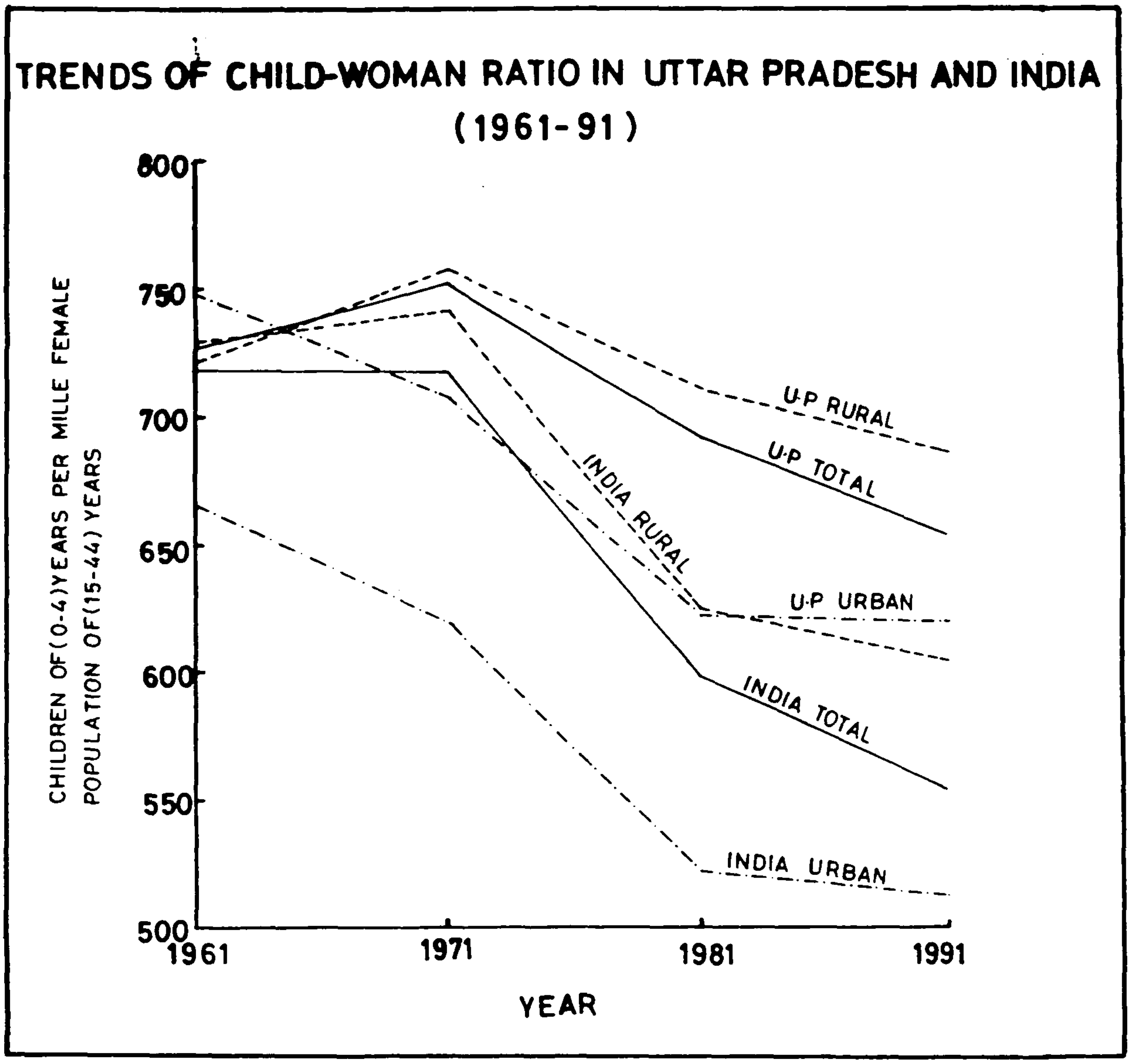

TRENDS OF CHILD-WOMAN RATIO IN UTTAR PRADESH AND INDIA
(1961-91)
CHILDREN OF (0-4) YEARS PER MILLE FEMALE POPULATION OF (15-44) YEARS
800
750
700
650
600
550
500
1961
1971
1981
1991
YEAR
U.P RURAL
U.P TOTAL
INDIA RURAL
U.P URBAN
INDIA TOTAL
INDIA URBAN

FIG. 18

population of Uttar Pradesh with the exception of the year 1961 Child-woman ratio was observed to be higher in rural population than the urban population. Child-woman ratio increased from 722 in 1961 to 759 in 1971 for the rural population while in Urban population of the state it sharply ran down from 749 in 1961 to 709 in 1971. The ratio sharply declined to 711 in 1981 and 686 in 1991 for rural population. Table shows that the rate of decline was sharp in rural population as compared to the urban population. Interestingly, during the most recent year 1991, it was rural child-woman ratio which fell slightly faster, it may be related to rural development and family welfare programmes in India. The rural/urban differential in child-woman ratio amounted to about one child less per woman in urban than in rural areas.

The location of work had been shown to be an important conditioning factors, work away from home was more likely to increase the conflict in demands on the women's time than work in the home or on a nearby form. Thus the relationship was found to be stronger in urban areas and among those in non-agricultural occupations.[03]

Urban areas were characterized by the factors thought to be conducive to lower fertility, i.e., high density, an industrial occupational structure and greater exposure to many aspects of modernization and development.

It may be pointed out further that even seven years of schooling of females had a pronounced effect in lowering fertility. However, at the present level of literacy and educational status of females in the state, the attainment of this standard would require organized efforts through many channels, including intensification of governmental efforts at promoting female education. As stated earlier, there was a relationship between age at marriage and educational status, improvement of the latter will have a salutary effect on the age at marriage. Improvement in female educational status will also yeild other benefits such as better child-rearing and the use of more nutritious food.[04]

Employment of females has several advantages but in the state of development of the country, with about 80 per cent of the population living in rural areas, it is doubtful if female employment per se would lead to reduction of fertility. However, employment of women in enterprises outside the home, especially before marriage, in towns and cities would go a long way in reducing fertility.[05]

REGIONAL PATTERNS OF FERTILITY

Birth Rate 1961

General Distribution

The distribution of birth rate among the districts may be arranged into quartiles of 2.20 to 12.40, 12.40 to 14.70, 14.70 to 18.20 and 18.20 to 38.90 (Fig.19). Fig. shows that a distinct big region of high to very high birth rate (18.20 - 38.90) is found to include the Himalayan and the west plain districts. This region comprises more than ninety per cent districts of this slab. These districts are Pithoragarh (18.20). Almora (18.60), Tehri Garhwal (19.10), Garhwal (20.60), Bulandshahr (19.50), Farrukhabad (19.50), Meerut (19.70), Ghaziabad (19.70), Aligarh (21.20), Bijnor (21.30), Budaun (24.60), Agra (25.80) and Moradabad (38.90). Two small regions of median to high birth rates are identified. One lies in the eastern part of west plain and includes the districts of Kheri (14.70), Shahjahanpur (16.40) and Pilibhit (16.80), and the second composed of Mainpuri (15.90), Firozabad (15.90), Etawah (16.10) and Etah (17.40) is located in the southwestern section of the state. The third slab ranging from 12.40 to 14.70 birth rates constitutes two small but distinct regions. One includes the districts of Rae Bareli (14.40), Allahabad (13.90), Mirzapur and Sonbhadra (14.00) and the other comprises five districts of Hardoi (13.50), Kanpur Nagar (14.40), Kanpur Dehat (14.40), Jalaun (13.90) and Hamirpur (12.40). A dominant distinct region of low to very low grade of (2.20 to 12.40) birth rates is located in the eastern half of the state. It includes eleven districts, they in descending order of the birth rates are Jaunpur (12.30), Faizabad

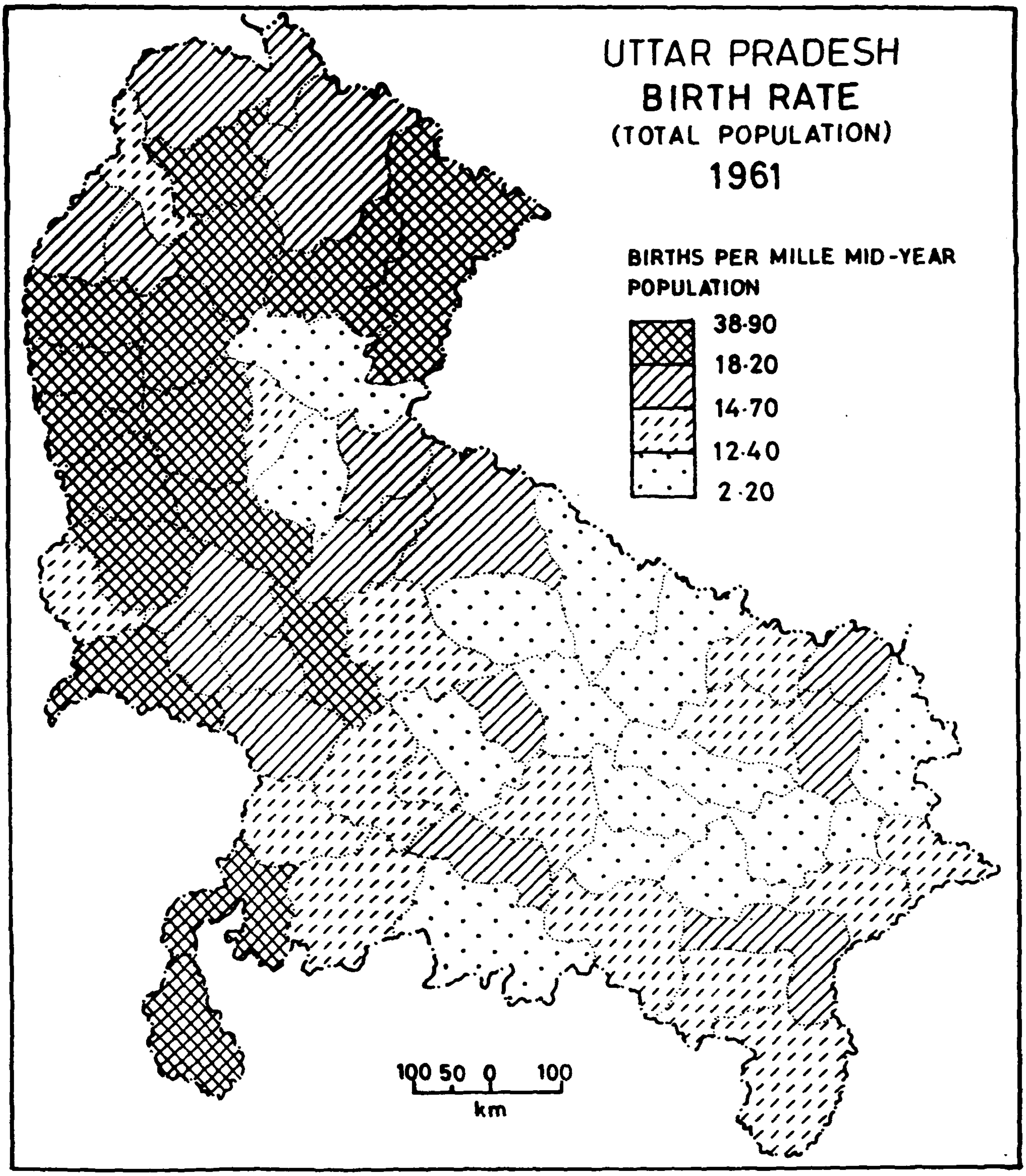

UTTAR PRADESH
BIRTH RATE
(TOTAL POPULATION)
1961
BIRTHS PER MILLE MID-YEAR POPULATION
38·90
18·20
14·70
12·40
2·20
100 50 0 100
km

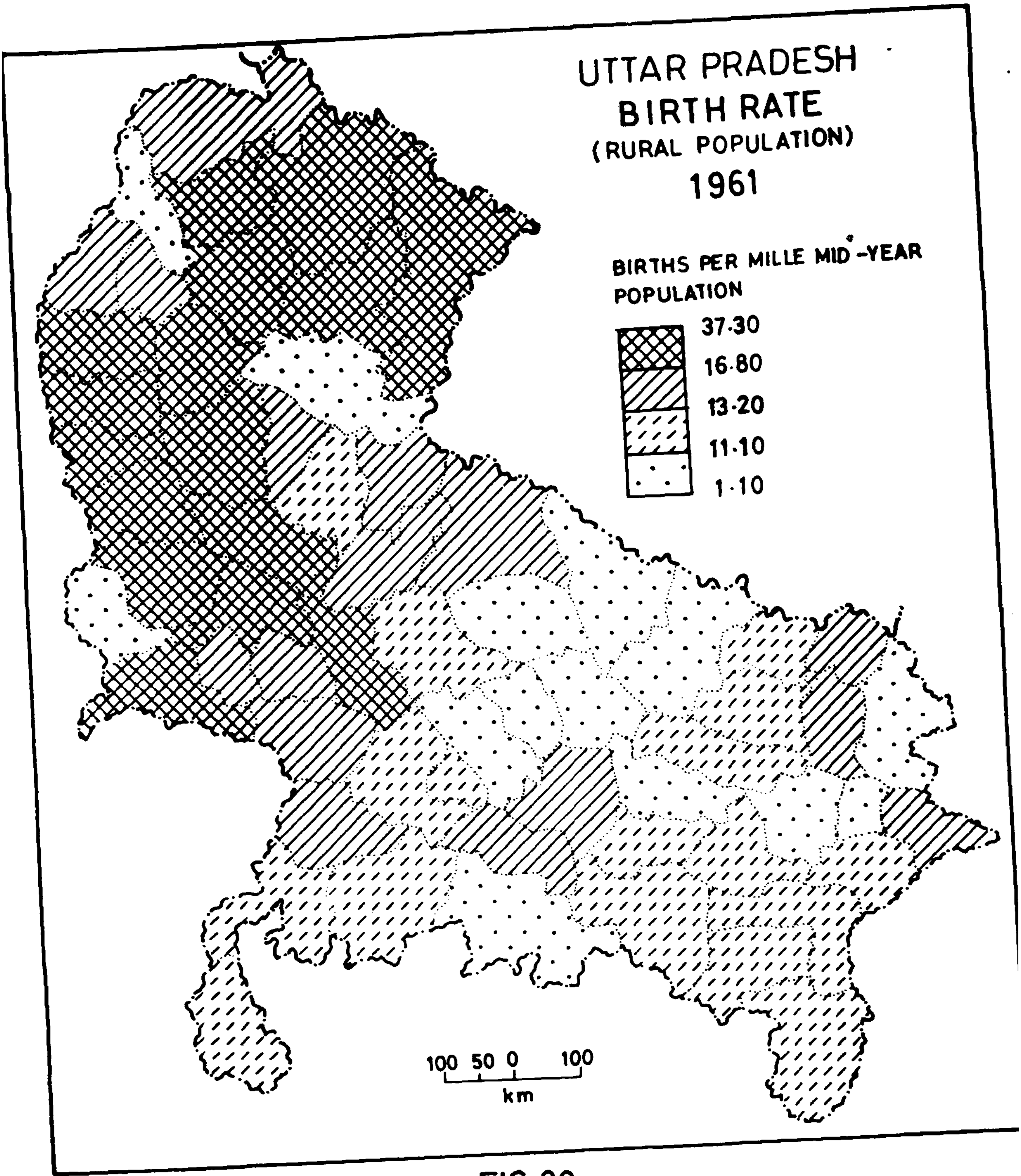
FIG.19

(12.00), Pratapgarh (11.80), Bahraich (11.60), Gonda (11.10), Deoria (11.00), Sultanpour (8.00), Azamgarh (5.50), Mau (5.50), Barabanki (3.20) and Sitapur (2.20).

Rural/Urban Distribution

The birth rate, too, is marked with notable variations in its distribution in the rural and urban population of the districts. It is a well known fact that in rural areas high birth rate prevails but patterns here as shown in map indicates high birth rate in urban areas, it is only because of the literate people who used to get their birth registered in the urban areas. The average birth rate per mille of the rural areas is almost identical with that of the total, but the average for the urban birth rate exceeds that of the total birth rate and rural birth rate by a little over 6 per mille and 7.40 per mille points respectively. Specifically, speaking, the average urban birth rate is about 21.40 which is higher than the rural (14.00) and total (15.40) birth rates.

The graded distribution of rural birth rate as depicted in fig.20, is almost identical with total rate. However, it has notable regional variations. The districts of high to very high rural birth rate (16.80 - 37.30) form a single dominant region unexpectedly in the western half of the state which is mainly composed of about half of the Himalayan districts and more than half of the west plain districts. The districts of median to high (13.20-16.80)



UTTAR PRADESH
BIRTH RATE
(RURAL POPULATION)
1961
BIRTHS PER MILLE MID-YEAR POPULATION
37·30
16·80
13·20
11·10
1·10
100 50 0 100
km

FIG. 20

birth rates form two notable but small regions. One lies in the western part and it includes only three districts. It is separated from relatively big region of same slab by Farrukhabad, Kanpur Nagar and Kanpur Dehat. Two distinct regions of median to low birth rates are found in almost eastern half of the state. The dominant region composed of about two-thirds districts of this grade lies in the eastern part stretched from Siddharthnagar in the north to Sonbhadra in the south. The other region is detached from the region of low to very low rural birth rates. Finally, it may be observed that rural birth rates decrease from west to east which may be probably caused by variations in the attributes of socio-economic aspects of the state.

The districtwise distribution of urban birth rates shows relatively a wide range of variations (4.20 - 44.30) as compared to rural birth rate (1.10 - 37.30). It varies from a minimum of 4.20 in Tehri Garhwal to a maximum of 44.30 in Moradabad (Table 07). The distinct surpentile belt of high to very high urban birth rates is found in the north half of the plain. Some districts of same grade separately form four small regions as shown in Fig.21. The two-thirds districts of median to high (22.10 - 26.00) urban birth rates lie in the western half of the state where some of them combinedly form two distrinct regions. One is composed of five districts of Meerut (22.80), Ghaziabad (22.80,

TABLE 07

BIRTH RATE (No. of births per mille mid-year population) BY DISTRICTS IN UTTAR PRADESH, 1961-90

District	1961			1971			1981			1990		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Uttar Kashi	15.70	16.00	4.40	13.10	14.10	2.20	13.70	12.30	9.00	6.10	0.56	12.65
Chamoli	18.10	18.50	9.20	17.40	17.40	6.30	15.40	17.00	5.00	7.77	0.76	5.68
Tehri Garhwal	19.10	19.40	4.20	11.20	10.60	16.90	13.30	13.70	4.10	10.41	11.10	7.28
Dehradun	14.20	9.40	19.70	16.90	7.40	19.50	12.50	6.30	18.90	9.81	12.11	22.23
Garhwal	20.60	21.10	13.30	20.40	22.80	13.00	11.50	12.10	7.00	13.79	13.64	14.66
Pithoragarh	18.20	19.60	12.20	11.30	11.40	8.50	10.60	10.60	9.30	14.37	1.50	4.14
Almora	18.60	18.30	24.00	16.90	16.60	20.20	8.70	8.30	13.10	4.96	0.40	20.77
Nainital	11.90	8.60	25.50	9.10	5.50	20.70	7.40	5.30	12.80	7.57	8.60	6.04
Bijnor	21.30	19.90	28.40	12.80	11.60	15.00	10.20	12.00	4.90	10.86	12.30	4.97
Moradabad	38.90	37.30	44.30	5.90	5.90	6.30	10.30	11.70	14.30	2.72	2.14	4.02
Rampur	13.80	15.60	7.20	6.90	6.40	7.10	9.90	9.40	5.30	11.57	13.34	0.64
Saharanpur	17.10	14.70	25.00	14.90	11.80	23.80	11.80	12.60	9.50	10.53	13.26	4.04
Hardwar	17.10	14.70	25.00	14.90	11.80	23.80	11.80	12.60	9.50	10.53	13.26	4.04
Muzaffarnagar	22.30	21.20	30.00	16.00	14.30	25.40	12.30	10.90	14.40	10.26	11.07	8.07
Meerut	19.70	18.90	22.80	13.70	13.70	18.50	11.00	11.70	11.80	8.93	4.62	16.73
Ghaziabad	19.70	18.90	22.80	13.70	13.70	18.50	10.00	11.00	9.50	7.15	7.66	10.00
Bulandshahr	19.50	19.30	22.10	18.30	18.50	20.30	10.50	12.20	3.40	6.30	9.93	7.18
Aligarh	21.20	20.80	23.00	24.40	24.40	24.40	9.20	10.50	5.20	9.40	7.85	5.36
Mathura	14.10	9.20	38.50	22.60	16.10	31.50	7.30	8.40	13.00	12.34	11.76	14.36
Agra	25.80	19.10	37.60	7.20	7.20	7.10	12.00	12.70	18.60	12.69	0.84	33.79
Firozabad	15.90	15.60	20.40	8.30	9.20	8.30	6.10	6.80	0.80	5.28	7.81	0.57
Etah	17.4	16.80	22.50	13.70	13.60	13.90	2.20	1.80	3.40	8.59	9.39	6.21
Mainpuri	15.90	15.60	20.40	8.30	9.20	8.30	6.10	6.80	0.80	5.28	7.81	0.55
Budaun	24.60	24.10	30.20	15.40	15.00	17.40	10.30	10.80	7.60	21.63	25.19	7.00
Bareilly	11.60	11.90	10.50	7.00	7.00	7.00	12.00	14.10	7.00	7.75	6.51	9.30
Pilibhit	16.80	16.00	22.20	10.70	15.50	10.70	1.60	1.50	2.20	9.79	11.57	0.32
Shahjahanpur	16.40	14.80	26.00	15.70	13.90	25.90	8.00	8.80	9.00	11.22	13.20	0.96
Kheri	14.70	14.00	27.10	12.40	6.90	17.50	2.20	1.30	10.70	9.68	8.82	19.52
Sitapur	2.20	1.10	15.50	10.10	10.10	10.00	7.30	7.20	7.80	9.79	7.80	3.98
Hardoi	13.50	12.90	22.10	10.70	10.10	15.30	4.70	4.60	5.30	9.32	7.21	1.32
Unnao	8.70	8.80	6.50	6.50	6.40	7.50	4.70	5.30	0.70	8.59	7.46	15.08

TABLE 07 (Contd.)

Lucknow	17.90	2.40	33.60	20.00	8.60	29.10	21.20	7.80	27.40	21.28	10.51	23.72
Rae Bareli	14.40	13.80	32.60	34.30	35.20	34.20	8.10	7.20	20.10	5.44	4.78	11.16
Farrukhabad	19.50	19.60	18.70	7.70	7.10	8.30	3.90	4.80	0.50	1.66	0.88	0.48
Etawah	16.10	14.30	33.80	15.10	15.10	22.10	5.60	5.10	8.90	10.20	10.68	0.51
Kanpur Dehat	14.40	11.10	19.20	14.20	14.30	14.10	8.50	6.80	10.10	5.26	1.86	20.00
Kanpur Nagar	14.40	11.10	19.20	14.20	14.30	14.10	8.50	6.80	10.10	5.26	1.86	20.19
Jalaun	13.90	13.40	16.70	10.10	10.30	8.80	7.80	6.90	1.90	11.68	8.39	0.81
Jhansi	19.00	12.60	39.30	18.50	15.20	20.50	9.40	7.80	11.30	14.61	1.81	0.33
Lalitpur	19.00	12.60	39.30	18.50	15.20	20.50	11.80	9.40	26.50	10.36	0.68	3.07
Hamirpur	12.40	11.40	24.20	8.70	8.90	8.40	5.50	6.20	2.00	16.65	19.20	0.06
Banda	7.30	7.10	10.80	12.10	12.10	12.00	5.60	6.30	3.00	15.14	17.92	0.07
Fatehpur	15.60	15.40	20.20	6.40	5.70	8.10	3.30	3.60	0.80	11.05	11.81	0.31
Pratapgarh	11.80	11.90	5.40	8.00	7.50	22.90	11.30	12.40	43.80	8.70	7.66	9.28
Allahabad	13.90	11.70	23.50	11.40	6.90	18.30	7.80	9.10	2.00	11.14	9.51	15.63
Bahraich	11.60	10.80	26.70	15.00	9.60	17.50	4.70	4.40	9.10	4.40	3.90	10.19
Gonda	11.10	10.90	14.70	10.20	9.60	11.30	8.10	5.00	3.10	0.44	0.34	1.01
Barabanki	3.20	2.90	8.30	12.60	12.40	16.30	9.20	6.60	7.90	2.39	2.48	0.98
Faizabad	12.00	11.30	19.60	8.30	9.40	6.10	9.50	9.60	0.60	15.07	10.53	44.45
Sultanpur	8.00	7.80	15.80	9.00	9.60	7.90	5.10	4.70	16.30	14.32	12.47	42.80
Siddharthnagar	12.90	13.00	7.00	17.00	17.00	18.50	5.50	5.70	1.10	11.76	11.48	17.08
Maharajganj	16.40	15.70	24.60	18.40	11.80	51.20	9.10	8.50	4.00	2.48	2.51	1.99
Basti	12.90	13.00	7.00	17.00	17.00	18.50	5.50	5.70	1.10	11.76	11.48	17.08
Gorakhpur	16.40	15.70	24.60	18.40	11.80	51.20	9.10	8.50	4.00	2.48	2.51	2.39
Deoria	11.00	10.90	13.80	9.30	5.30	9.50	10.50	11.50	11.20	26.97	26.99	9.05
Mau	5.50	4.70	21.00	9.80	8.40	16.00	7.70	7.90	6.30	23.08	14.82	14.59
Azamgarh	5.50	4.70	21.00	9.80	8.40	16.00	7.70	7.90	6.30	23.08	14.82	14.45
Jaunpur	12.30	11.80	20.00	10.10	9.50	12.00	4.90	4.50	9.50	3.93	3.89	0.26
Ballia	13.40	13.20	19.00	7.70	7.70	7.90	12.60	6.40	70.40	17.17	17.00	22.50
Ghazipur	13.50	12.80	30.90	13.40	12.00	18.10	6.30	6.90	2.60	1.91	16.87	1.31
Varanasi	18.00	12.00	37.60	6.30	6.30	6.50	14.80	9.10	25.20	12.08	6.63	29.72
Mirzapur	14.00	12.60	25.10	7.80	9.00	4.30	2.40	1.90	5.70	3.72	0.34	5.91
Sonbhadra	14.00	12.60	25.10	7.80	9.00	4.30	2.40	1.90	5.70	3.72	0.34	6.00
Uttar Pradesh	15.40	14.00	21.40	12.79	11.60	14.60	8.69	8.16	10.27	9.91	8.50	9.84

Source - Vital Statistics of India, 1961, 1971, 1981 and 1990. The unpublished data of 1990 is obtained from the Directorate of Medical and Health Services, Swasthya Bhavan, Lucknow.
The data of some of the districts were not available, they had been adjusted from the previous records and the data of adjacent districts.

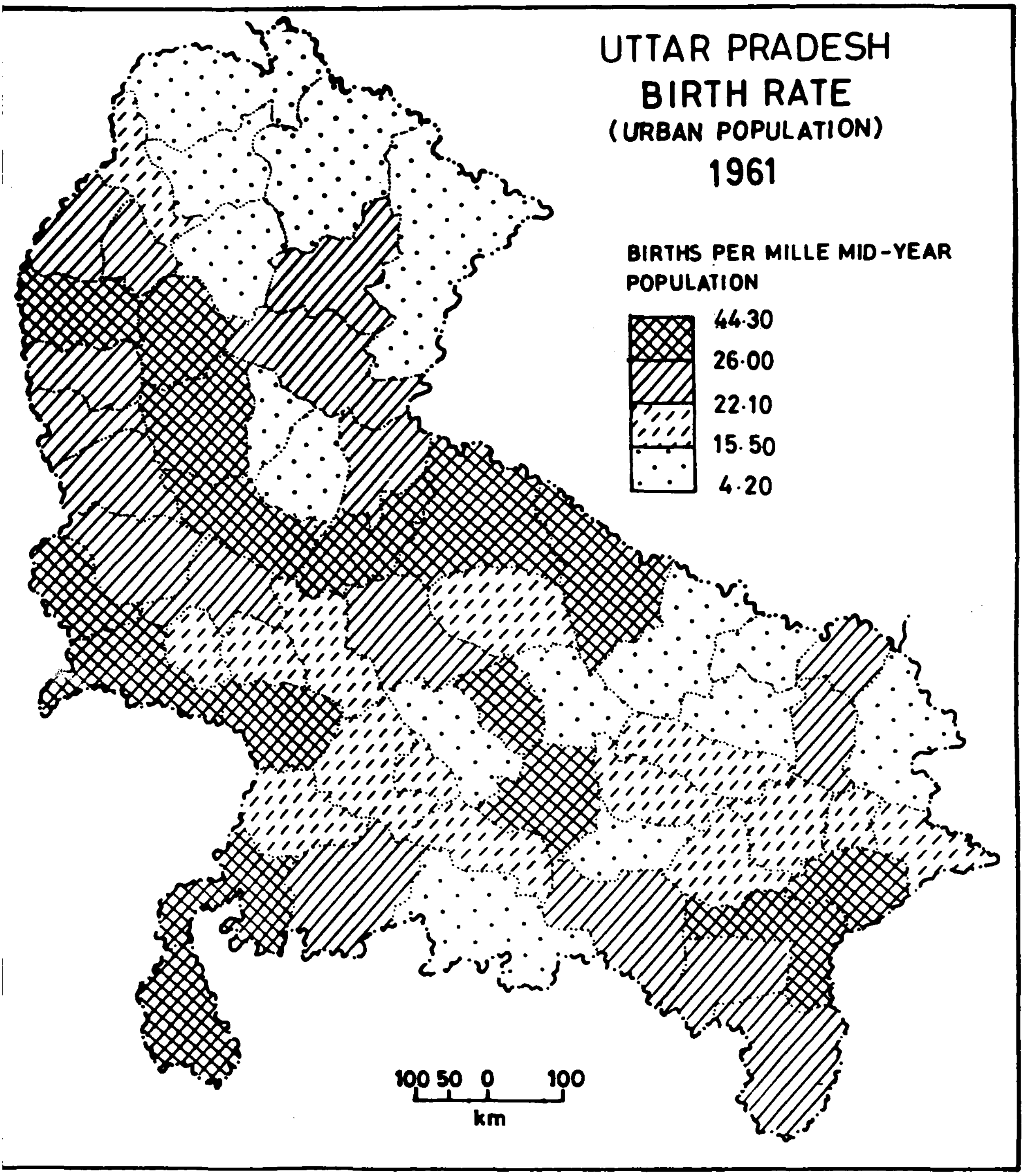

UTTAR PRADESH
BIRTH RATE
(URBAN POPULATION)
1961
BIRTHS PER MILLE MID-YEAR POPULATION
44·30
26·00
22·10
15·50
4·20
100 50 0 100
km

FIG.21

Bulandshahr (22.10), Aligarh (23.00) and Etah (22.50), and the other comprises Almora (24.00), Nainital (25.50) and Pilibhit (22.20) districts. Allahabad, Mirzapur and Sonbhadra form a small region of this grade in southeastern part of the state. Two regions of median to low urban birth rates are indentified in almost eastern part of the state (Fig. 21). These two regions are separated by Rae Bareli a district of very high birth rate. Districts of low to very low urban birth rates (15.50 - 4.20) form two identifiable regions: one lies in the Himalayan zone and the other in the eastern section of Uttar Pradesh.

Birth Rate 1971

General Distribution

The distribution of number of births per mille mid-year population in Uttar Pradesh for the year 1971 is far from uniform. It varies from 34.20 in Rae Bareli to 5.90 in Moradabad whereas the state average accounts for 12.79. The districtwise distribution of birth rates are arranged into the grades of quartiles of very high to high (34.20 - 16.00), high to median (16.00 - 12.40), median to low (12.40 - 8.70) and low to very low (8.70 - 5.90) birth rate. Fig.22 depicts that there is no uniform pattern of distribution which could aid to identify dominant region of any grade. The districts of high to very high birth rates are scattered over the

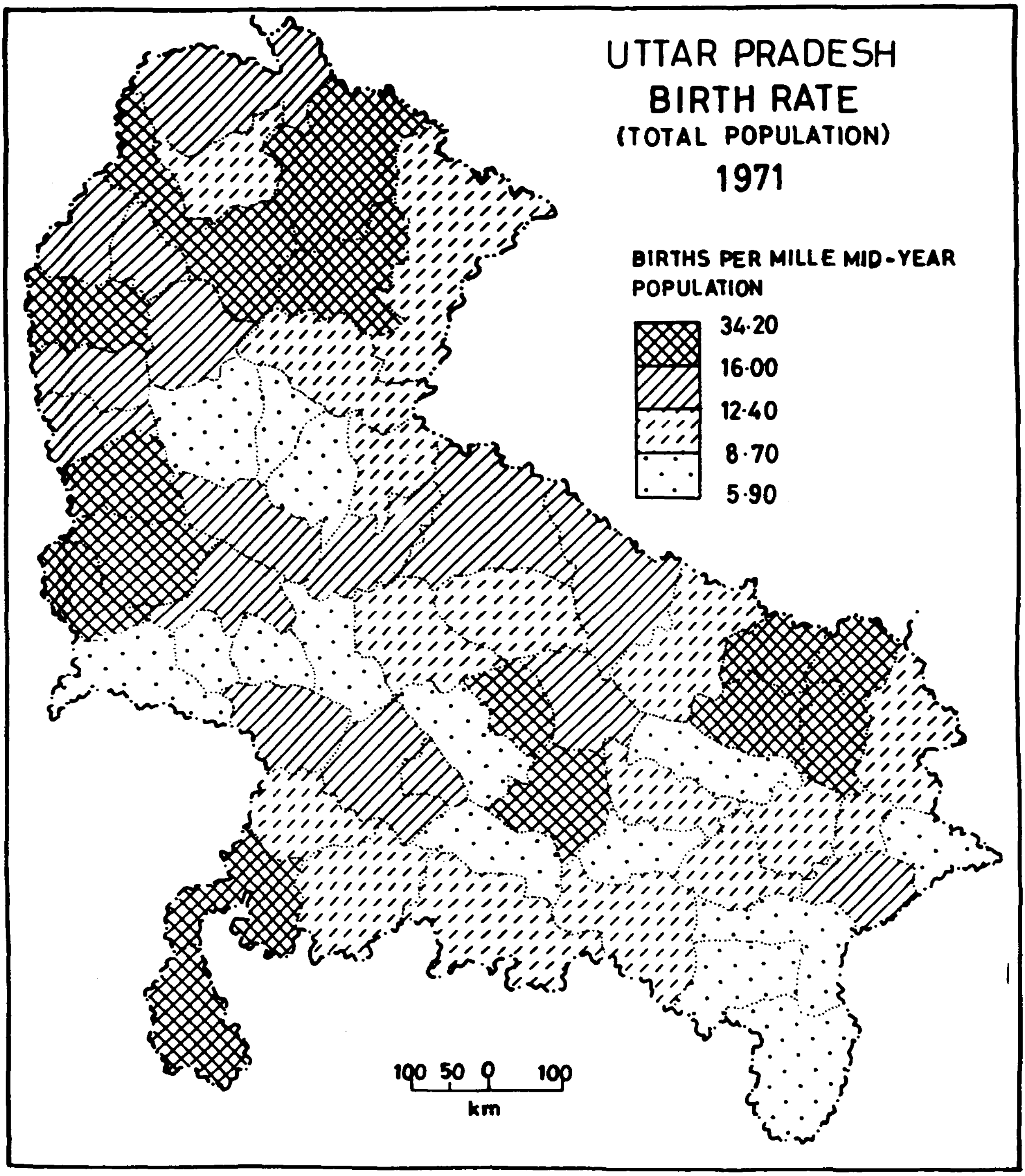

UTTAR PRADESH
BIRTH RATE
(TOTAL POPULATION)
1971
BIRTHS PER MILLE MID-YEAR POPULATION
34·20
16·00
12·40
8·70
5·90
100 50 0 100
km

FIG. 22

state. Some of them form three small regions. One which lies in the Himalayan zone comprises Dehradun (16.90), Garhwal (20.40), Almora (16.90) and Chamoli (17.40), second small region is found in the western part which includes three districts of Bulandshahr (18.30), Aligarh (24.40) and Mathura (22.60), and the third region comprised of Basti, Siddharthnagar, Gorakhpur and Maharajganj was observed in the northeastern part. The overwhelming majority of the districts belonged to median to high birth rates form discontinuous region over the western plain. More than half of the districts of median to low birth rates constitutes a narrow belt in the eastern half stretched from Jalaun in the southwest to Deoria in the northeast. a narrow belt composed of half of the districts of low to very low grade of birth rates is identified in the eastern part of the plain. A second patch of the same level is found in the western part which comprises Moradabad (5.90), Rampur (6.90) and Bareilly (7.00) and the third is found in south-eastern part to include Varanasi (6.30), Mirzapur (7.80) and Sonbhadra (7.80).

Rural/Urban Distribution

The break up of rural and urban birth-rate for the year 1971, varies respectively from 5.30 to 35.20 and 2.20 to 51.20 with the state average of 11.60 and 14.60. The

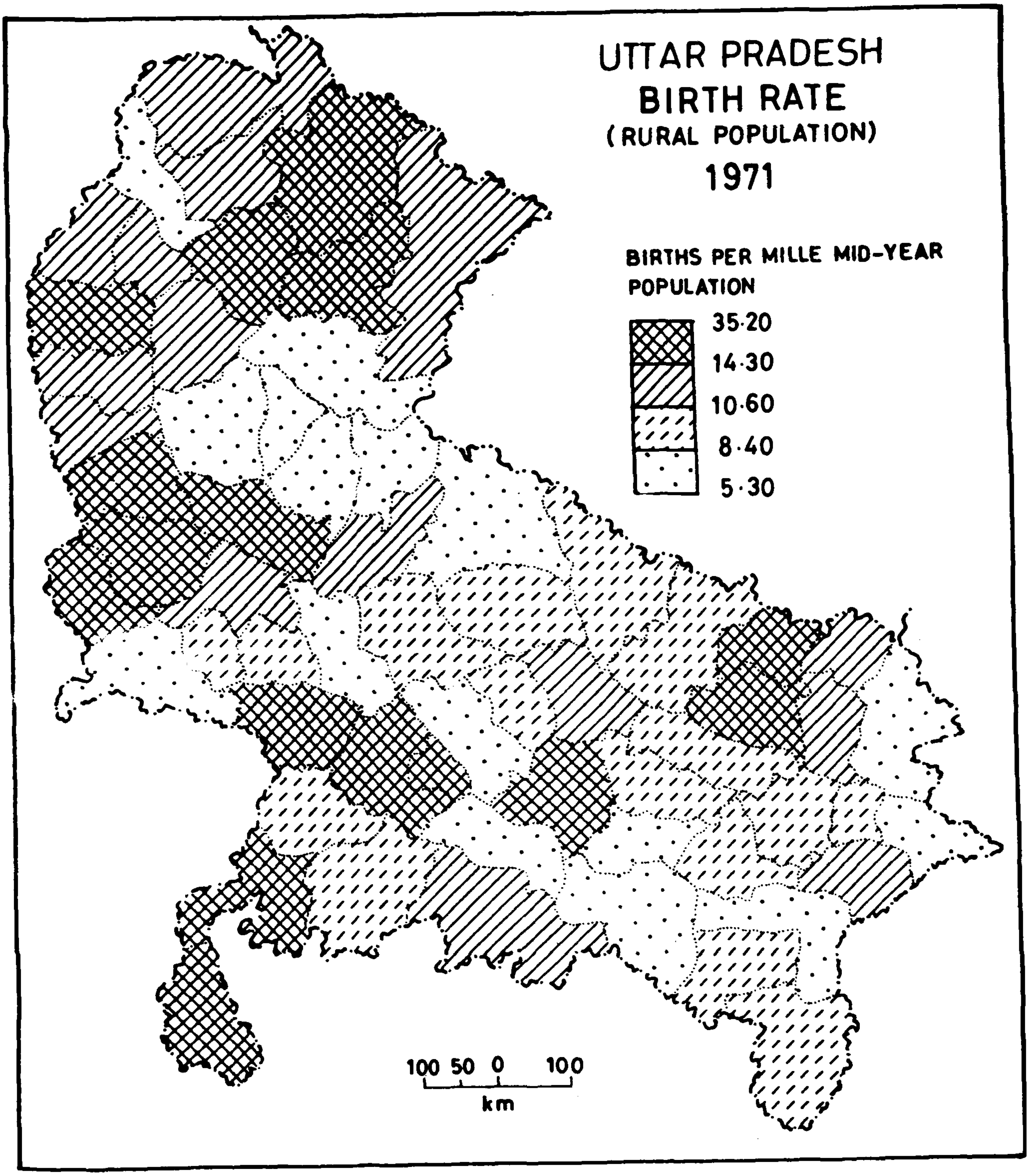

UTTAR PRADESH
BIRTH RATE
(RURAL POPULATION)
1971
BIRTHS PER MILLE MID-YEAR POPULATION
35·20
14·30
10·60
8·40
5·30
100 50 0 100
km

FIG. 23

distribution of rural birth rate as shown in Fig.23 depicts that the majority of western and the Himalayan districts have the rural birth rates higher than the state average. Fig.23 shows that two small regions of high to very high (14.30 - 35.20) birth rates are found. One lies in the Himalayan zone to include Garhwal (22.80), Chamoli (17.40) and Almora (16.60). The other is found in the western part which is composed of Aligarh (24.40), Mathura (16.10), Bulandshahr (18.50) and Budaun (15.00). About half of the districts of median to high birth rates form a discontinuous region in the northwestern part of the state. All the districts of median to low grade are observed in eastern half of the state and about fifty per cent of them constitutes a dominant region over central and eastern plains. A distinct region of low to very low grade is delimited in the western part. It is comprised of six districts of Moradabad, Nainital, Rampur, Bareilly, Pilibhit and Kheri. A horizonal belt of same slab stretched from Farrukhabad in the west to Varanasi in the east is found in the southern half of the plain.

The urban birth rate is observed to be higher than that of the rural birth rate and its range of interdistrict variations is relatively wide. It can be seen from Fig.24 that the districts of high to very high (20.30 - 51.20) urban birth rates do not form a single continuous region,

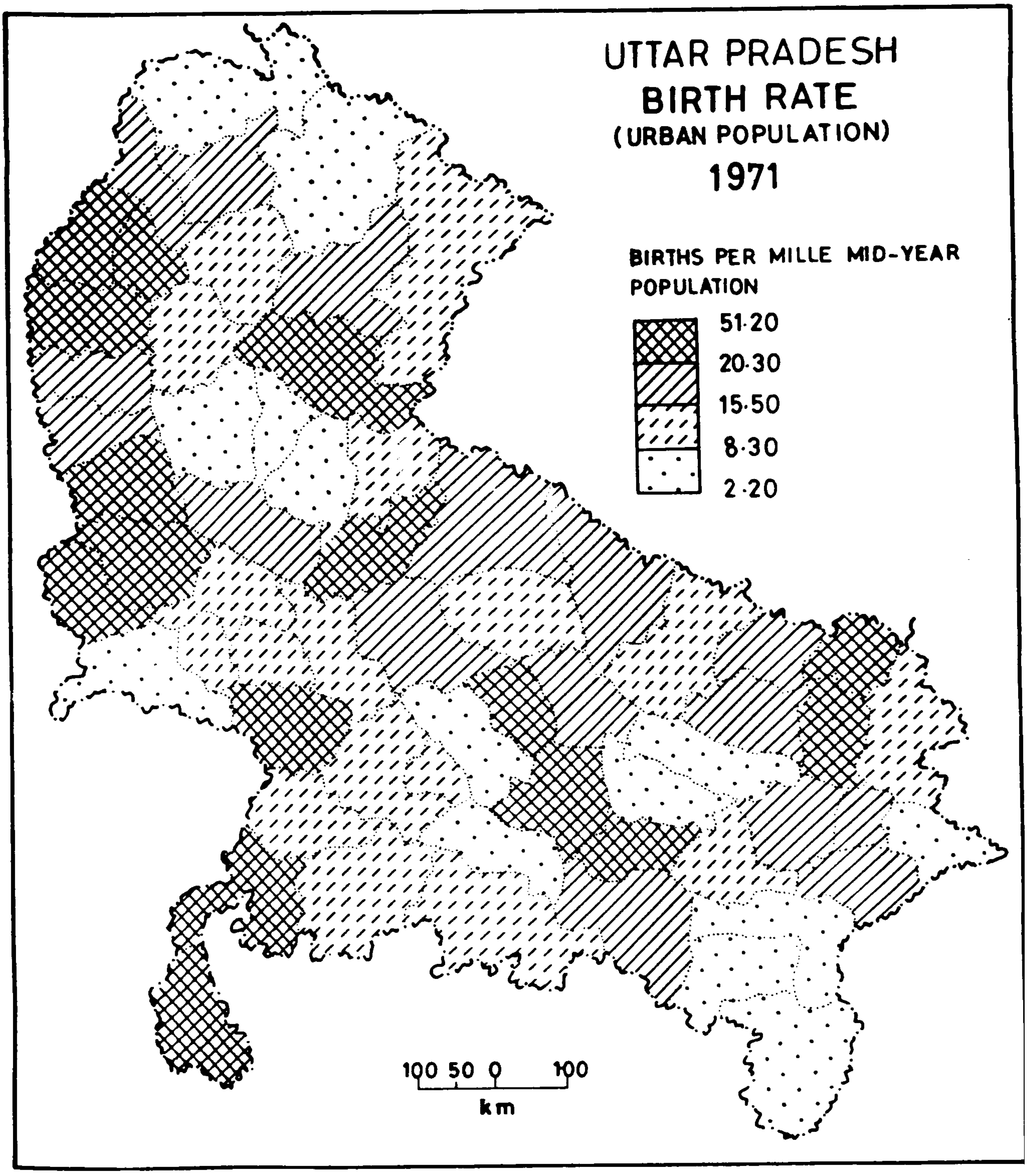

UTTAR PRADESH
BIRTH RATE
(URBAN POPULATION)
1971
BIRTHS PER MILLE MID-YEAR POPULATION
51·20
20·30
15·50
8·30
2·20
100 50 0 100
km

FIG. 24

rather they are grouped into three small zones. Two of them lie in the Ganga-Yamuna doab and the third in the central plain. The districts falling under the grade of 15.50-20.30 birth rates are found to occur in rather, scattered pattern and delimit two distinct regions. One lies in the central plain to include four districts of Hardoi (15.30), Kheri (17.50), Bahraich (17.50) and Barabanki (16.30). This region is interrupted by Gonda (11.30) a district of median to low birth rate form the region of same grade. About half of the districts of median to low birth rates (15.50-8.30) forms of a surpentile belt in southwestern part of the state. Other districts of the same level are too scattered to form an indentifiable region. Two small but distinct regions of low to very low rates may be identified : one lying in the western part to include Moradabad (6.30), Rampur (7.10) and Bareilly (7.00) and the other in the southeastern part to include Varanasi (6.50), Mirzapur and Sonbhadra (4.30). Jaunpur and Allahabad interrupt to extend the latter region westward to include four districts of the same slab.

Birth Rate 1981

General Distribution

The birth rate varies from 1.60 in Pilibhit to 21.20 in Lucknow with the state average of 8.69. The inter-district distribution is arranged into quartiles of

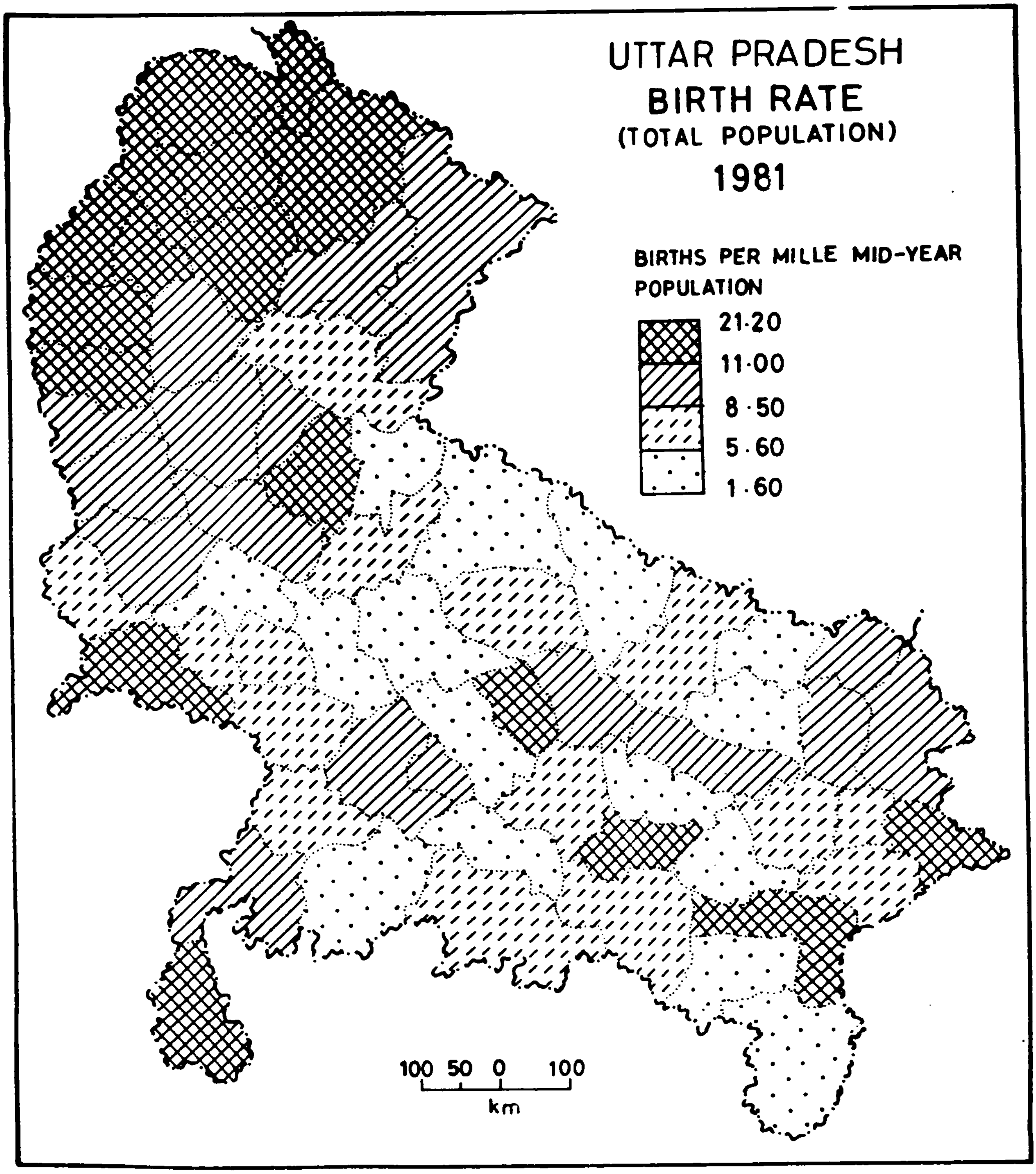

UTTAR PRADESH
BIRTH RATE
(TOTAL POPULATION)
1981
BIRTHS PER MILLE MID-YEAR POPULATION
21·20
11·00
8·50
5·60
1·60
100 50 0 100
km

FIG. 25

1.60 to 5.60, 5.60 to 8.50, 8.50 to 11.00 and 11.00 to 21.20 birth rates. Fig.25 shows that with the exception of Almora (8.70) and Pithoragarh (10.60), all the districts of the Himalayan zone and four districts of west plain lying in the Ganga-Yamuna doab form a big region of high to very high (11.00 - 21.20) birth rates. Other districts of the same grade are singly distributed therefore, they fail to delimit an indentifiable region. The distinct region of median to high slab is obserbed to be attached to the south of the region of very high grade. It includes the districts of Ghaziabad (10.00), Bulandshahr (10.50), Aligarh (9.20), Budaun (10.30), Moradabad (10.30), Rampur (9.90) and Bijnor (10.20). Five districts of the same range constitute a narrow belt in the northeastern part. They, in ascending order of their birth rates, are Gorakhpur (9.10), Maharajganj (9.10), Barabanki (9.20), Faizabad (9.50) and Deoria (10.50). Sixty per cent districts of low to very low (5.60 - 1.60) birth rates constitute a big region in the central part stretched from Pilibhit (1.60) in the north to Hamirpur (5.50) in the south (Fig.25).

Rural/Urban Distribution

The break-up of birth rate in terms of rural and urban varies from 1.30 to 17.00 and from 0.50 to 70.40 respectively. The respective averages for the state are

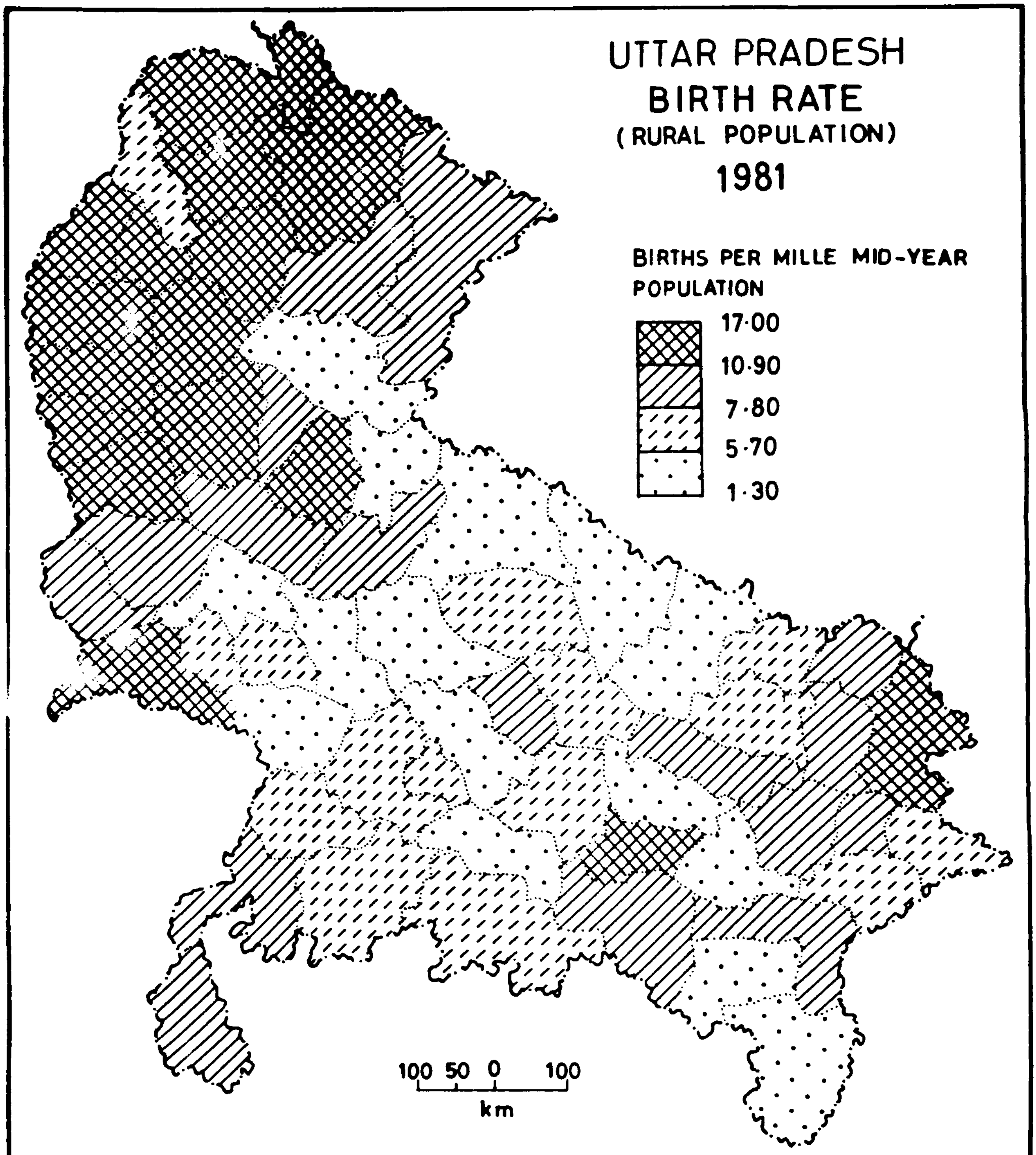

UTTAR PRADESH
BIRTH RATE
(RURAL POPULATION)
1981
BIRTHS PER MILLE MID-YEAR POPULATION
17·00
10·90
7·80
5·70
1·30
100 50 0 100
km

FIG. 26

8.16 and 10.27. The regional distribution of birth rate in rural population is very similar to that of the total population. The most prominent region comprising seventy-five per cent districts of high to very high (10.90 and above) birth rates are found in northwestern part to include about half of the Himalayan and west plain districts(Fig.26). This region is separated from a dominant region of low grade by a narrow belt of median to high (7.80 - 10.90) birth rates. Half of the districts of median to low (7.80 - 5.70) birth rates form a discontinuous region in the central part to include some of the central plain districts and the plateau districts. Mainpuri (6.80), Firozabad (6.80), Basti (5.70), Siddharthnagar (5.70), Ballia (6.40) and Ghazipur (6.90) districts of the same slab are scattered so sporadically that they fail to constitute any identifiable region.

Interdistrict distribution of birth rate in urban areas varies within the range of 0.50 to 70.40 with the minimum in Farrukhabad and the maximum in Ballia. It may be seen that even the urban maximum index is above the rural average for the state. However, the range of variations is quite small. The pattern of distribution of birth rate in urban areas may be projected systematically by grouping the birth rate into four grades of 11.30 to 70.40, 7.60 to 11.30 ,

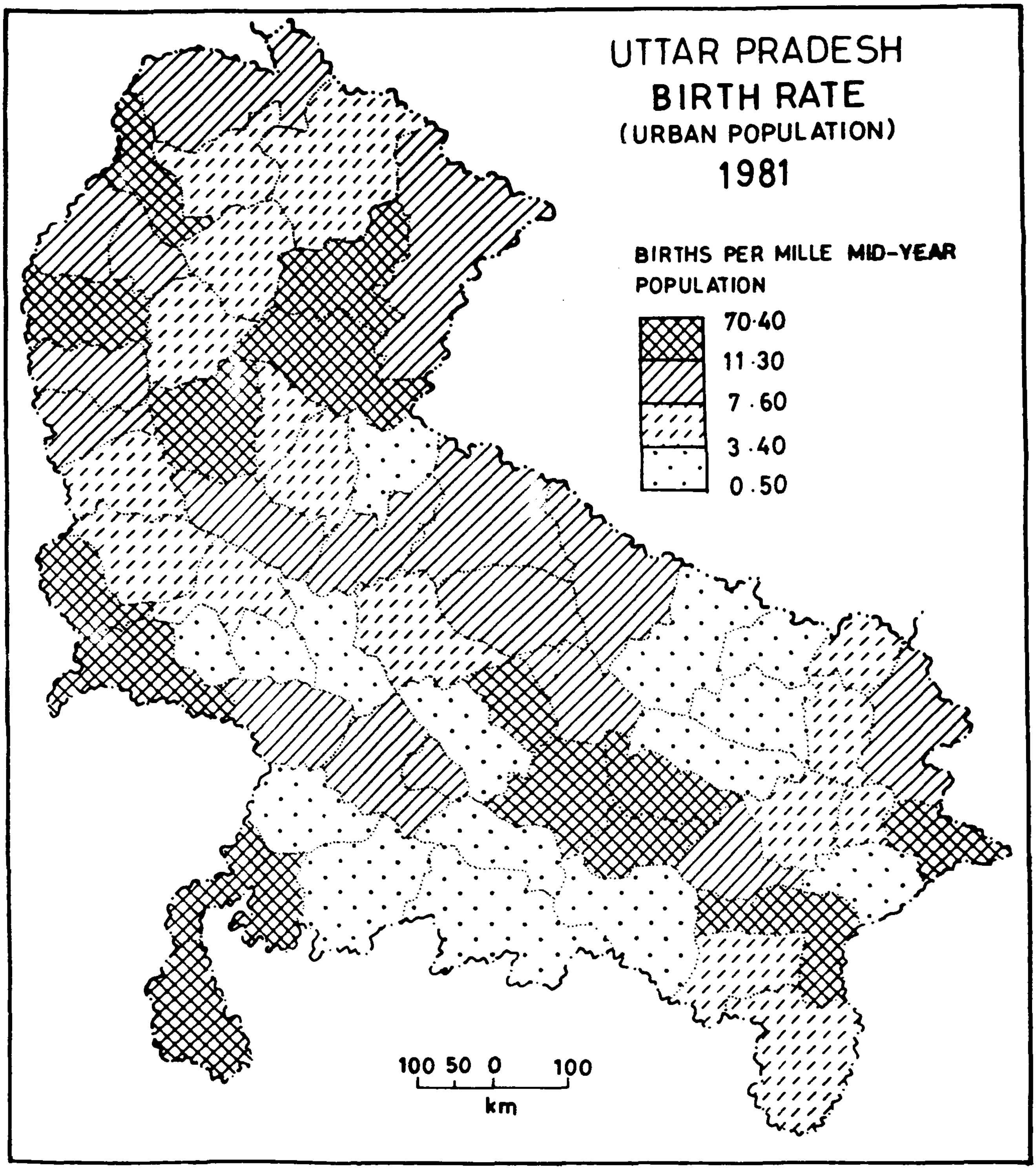

UTTAR PRADESH
BIRTH RATE
(URBAN POPULATION)
1981
BIRTHS PER MILLE MID-YEAR POPULATION
70·40
11·30
7·60
3·40
0·50
100 50 0 100
km

FIG. 27

3.40 to 7.60 and 0.50 to 3.40 as shown in Fig.27. The principal feature revealed by this graded distribution is that in twenty-nine per cent of the districts of the state the birth rate is above 10.27. Considering the four grades separately we find that four central districts namely, Lucknow, Rae Bareli, Faizabad and Sultanpur and three districts of the northern part (Almora, Nainital and Moradabad) having high to very high birth rates constitute two small distinct regions. These two regions are separated by a distinct region of median to high birth rate. It comprises Budaun (7.60), Shahjahanpur (9.00), Kheri (10.70), Bahraich (9.10), Sitapur (7.80) and Barabanki (7.90). It may be readily seen from the map that a detached region of median to low rate is found in the northern and western parts. Two small regions of this grade lie in the eastern half of the state. One is composed of Maharajganj, Gorakhpur, Azamgarh and Mau, and the other comprises Mirzapur and Sonbhadra. Some of the central plain districts and the plateau districts form an identifiable region of low to very low birth rate (Fig.27). Gonda (3.10), Siddharthnagar (1.10), Basti (1.10) and Faizabad (0.60) districts of the same grade form a small region. The over all distribution of birth rate in urban areas during 1981 do not depict uniform pattern.

The difference in the rural/urban registered birth rates is generally very high. It is likely that the higher registered birth rates in urban areas are due to better registration of institutional births both pertaining to urban and rural areas.[06]

Birth Rate 1990

General Distribution

Birth rate (the number of births per mille mid-year population among the districts of Uttar Pradesh for the year 1990 varies between 0.44 and 26.97 with relatively the highest birth rate in Deoria, whereas Gonda is at the other side of the scale as shown in Table 07. The distribution of birth rates among the districts may be arranged into quartiles of 0.44 to 5.28, 5.28 to 9.79, 9.79 to 12.08 and 12.08 to 26.97. The districts of high to very high birth rates are scattered over the state. However six districts of eastern part of the state and three districts of plateau section form two distinct regions. The former is comprised of Sultanpur (14.32), Faizabad (15.07), Ballia (17.17), Azamgarh (23.08), Mau (23.08) and Deoria (26.97), and the latter includes Jhansi (14.61), Banda (15.14) and Hamirpur (16.65). Six districts belonged to median to high (9.79 - 12.08) birth rates forms a significant region in north-western part of the state which includes Dehradun (9.81), Muzaffarnagar (10.26), Tehri Garhwal (10.41), Saharanpur (10.53), Hardwar (10.53) and Bijnor (10.86). The majority of the median to low (9.79 - 5.28) birth rate districts lie in the western part of the state such as Bulandshahr (6.30), Ghaziabad (7.15), Etah (8.59), Meerut (8.93), Aligarh (9.40), Mainpuri and Firozadabad (5.28). The districts of Kheri (9.68), Hardoi (9.32), Unnao (8.59), Rae Bareli (5.44) and Pratapgarh (8.70) are being formed a continuous narrow belt. The wherewhelming majority of the districts belonged to low to very low birth rates form discontinuous region over the central and more than half of the eastern part of the state (Fig.28).

Uttar Pradesh, the most populous state, the over-whelming agricultural state, and the heart land of Hindi belt having a sizeable proportion of Muslim population, was at the other end of the scale displaying the highest birth rate.[07]

Rural/Urban Distribution

The birth rate is marked with notable variations in its distribution in the rural and urban populations of the districts. The general distribution, to be sure, is that the urban population has a higher proportion of birth rate than does the rural population. The average birth rate of the rural population is almost identical with that of the total

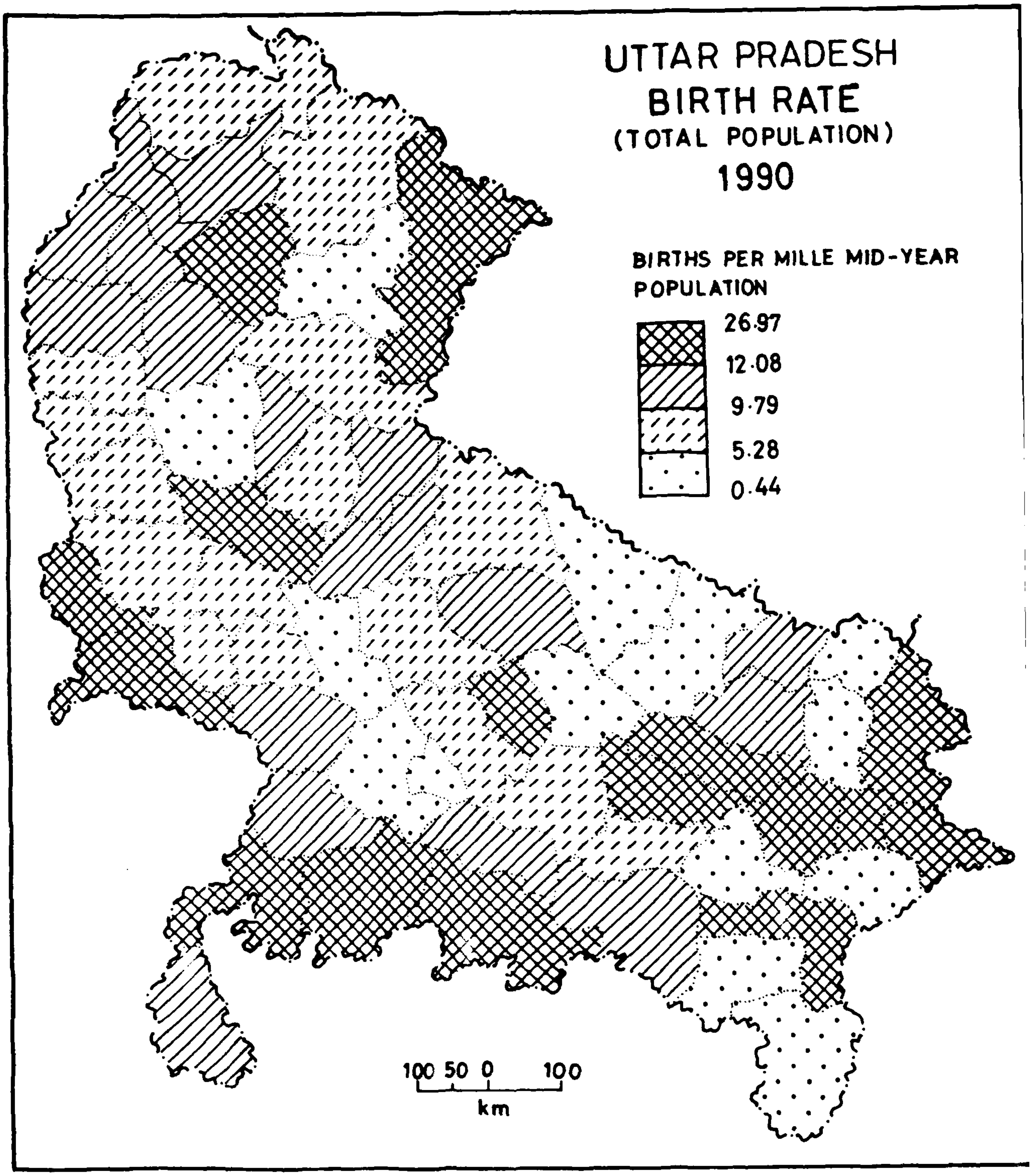

UTTAR PRADESH
BIRTH RATE
(TOTAL POPULATION)
1990
BIRTHS PER MILLE MID-YEAR POPULATION
26.97
12.08
9.79
5.28
0.44
100 50 0 100
km

FIG. 28

but the average for the urban population exceeds that of the rural population by a little over 1.34 points. The urban average is about 9.84 whereas the rural and total averages are 8.50 and 9.91 respectively.

The distribution of birth rates among the districts may be grouped into quartiles of 0.34 to 2.51, 2.51 to 8.39, 8.39 to 12.11 and 12.11 to 26.99. The graded distribution of birth rate in rural areas as depicted in Fig.29 shows that a continuous zone of low birth rate, i.e., less than the state average of 8.50, is found in the state. The districts which are under the high to very high (12.11 to 26.99) birth rates are found to be grouped into three distinct regions. First lies in the north western part and includes the districts of Dehradun (12.11), Bijnor (12.30), Saharanpur (13.26), Hardwar (13.26), Garhwal (13.64), second in eastern part to include Sultanpur (12.47), Azamgarh (14.82), Mau (14.82), Ghazipur (16.87), Ballia (17.00), Deoria (26.99), and the third in west plain to comprise Rampur (13.34), Budaun (25.19) and Shahjahanpur (13.20) districts. The districts of median to high (8.39 to 12.11) birth rates, constitute two small regions each comprised of three districts as shown in Fig.29. The districts of median to low grade (8.39 to 2.51) of birth rates in the rural areas form a continuous region like crescent and extends from the Tarai region to central and eastern plain regions,

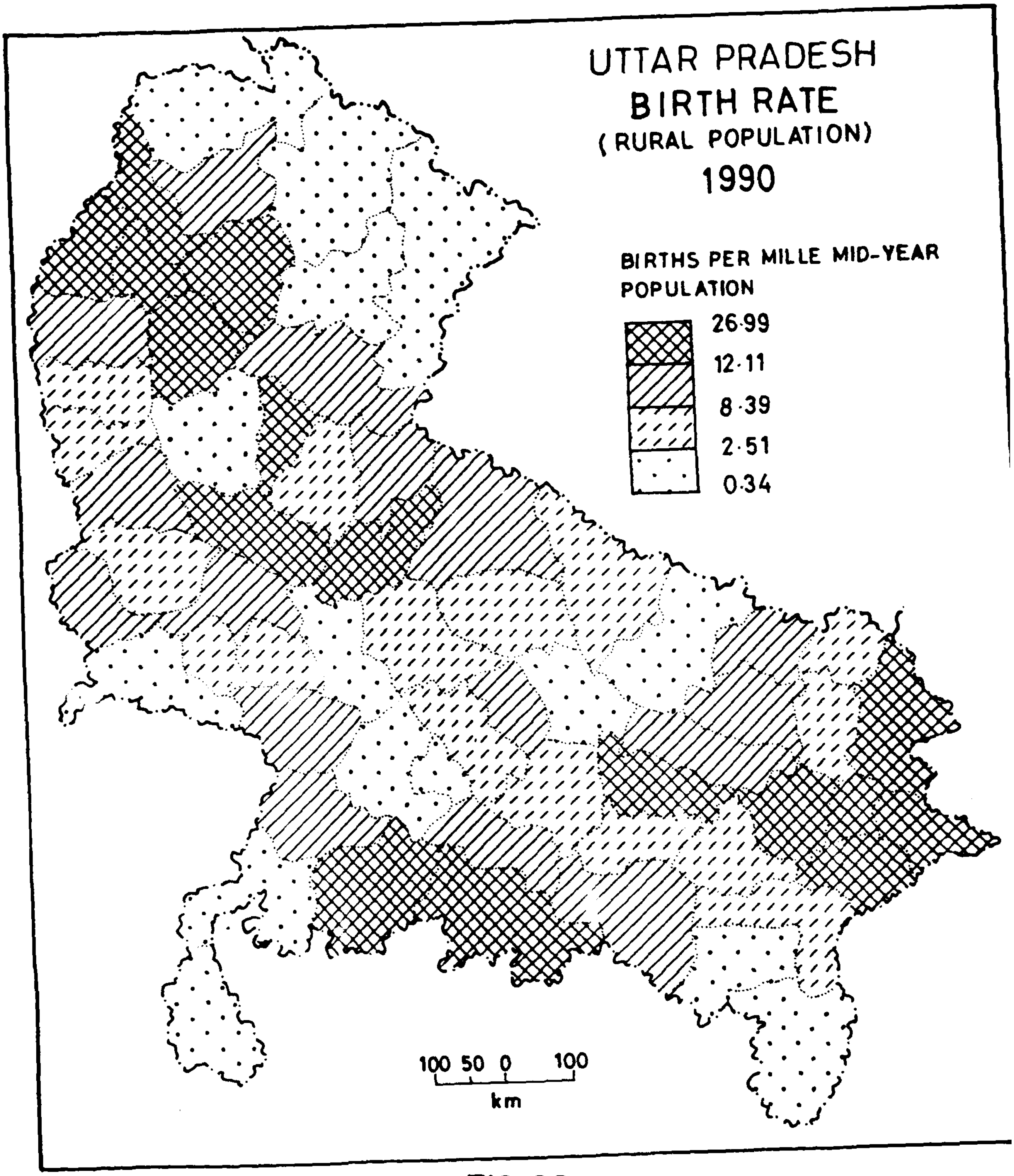

UTTAR PRADESH
BIRTH RATE
(RURAL POPULATION)
1990
BIRTHS PER MILLE MID-YEAR POPULATION
26·99
12·11
8·39
2·51
0·34
100 50 0 100
km

FIG. 29

which includes the districts of Bahraich (3.90), Sitapur (7.80), Hardoi (7.21), Unnao (7.46), Rae Bareli (4.78), Pratapgarh (7.66), Jaunpur (3.89) and Varanasi (6.63). The Himalayan districts form an identifiable region of low to very low grade of birth rates (Fig.29). Remaining districts of this state fail to constitute identifiable region on any part of the state.

In urban population majority of the districts stand on the higher side of high to very high (15.08 to 44.45) birth rate. The urban birth rate has the range of variations doubled among the districts of the region as compared to rural birth rate. It varies between 0.06 and 44.45 among the districts with the state average of 9.84. It clearly shows that there are high concentration of districts at the lower side of the scale. The districts which are under the first grade of high to very high (15.08 to 44.45) birth rate are found to be grouped into two distinct regions : one lies in the central part and the second in the eastern part of the state (Fig.30). These small regions of median to high grade of (6.21 to 15.08) birth rate are found in the state. First is observed in the Himalayan zone to include Uttar Kashi (12.65), Tehri Garhwal (7.28) and Garhwal (14.66). Second lies in the western part of the state and includes Ghaziabad (10.00), Bulandshahr (7.18), Budaun (7.00), Etah (6.21) and Bareilly (9.30)

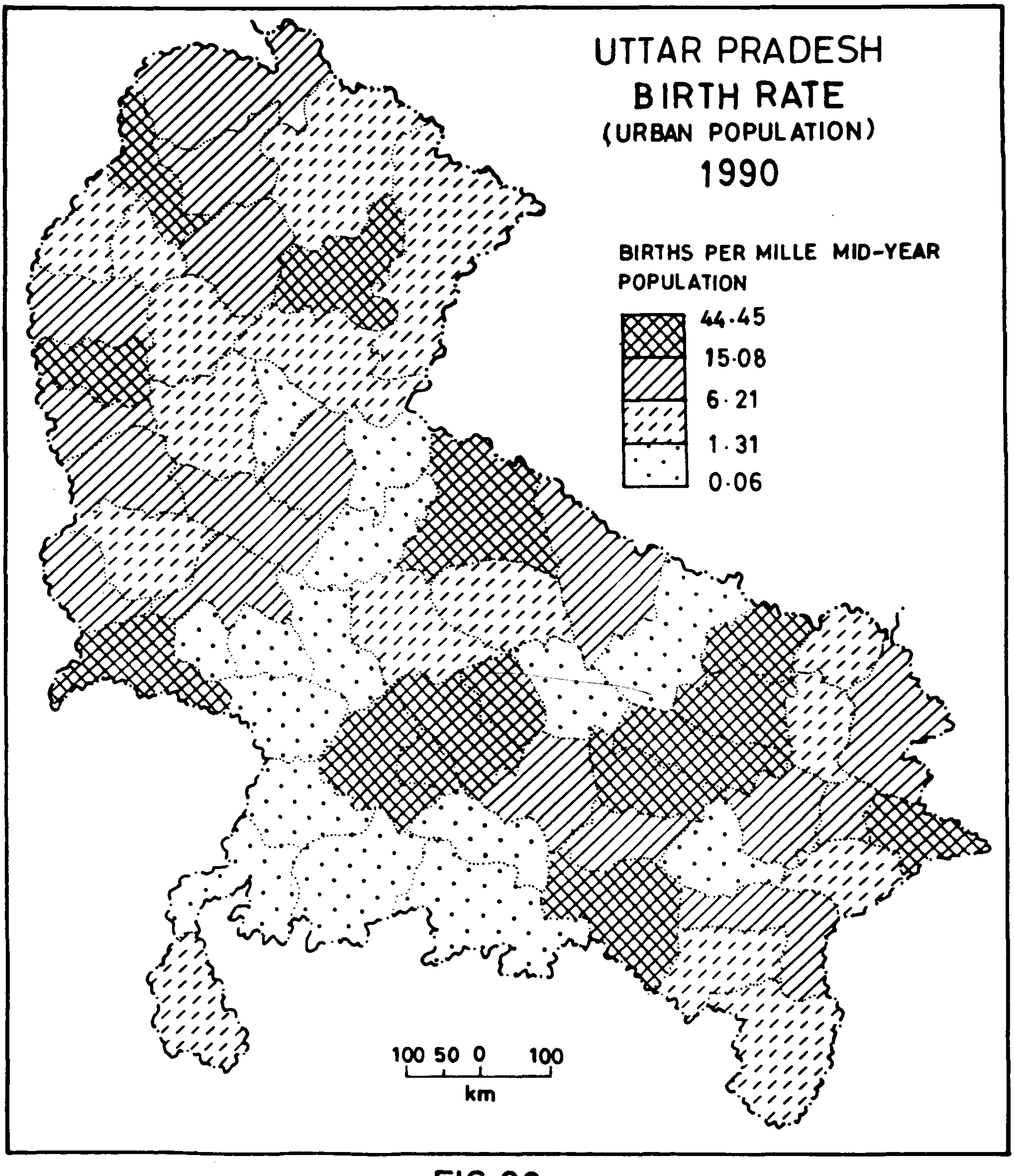

UTTAR PRADESH
BIRTH RATE
(URBAN POPULATION)
1990
BIRTHS PER MILLE MID-YEAR POPULATION
44.45
15.08
6.21
1.31
0.06
100 50 0 100
km

FIG. 30

districts. Third lies in the extremely eastern part of the state. The districts of median to low grade of (6.21 to 1.31) birth rates form a small distinct region which lies almost in the northwestern part which includes Nainital (6.04), Saharanpur (4.04), Hardwar (4.04), Bijnor (4.97) and Moradabad (4.02). Remaining districts of the state lie under low to very low grade of (1.31 to 0.06) birth rates as shown in Fig.30. Eleven districts of them demarcate single most continuous region which stretches vertically from Tarai belt to the southern plateau of the state like to include Pilibhit (0.32), Shahjahanpur (0.96), Farrukhabad (0.48), Mainpuri (0.55), Firozabad (0.57), Etawah (0.51), Jalaun (0.81), Jhansi (0.33), Hamirpur (0.06), Fatehpur (0.31) and Banda (0.07).

Child-Woman Ratio 1961

General Distribution

The distribution of general child-woman ratio i.e., the number of children of 0-4 years per mille female population of 15-44 years for the year 1961 shows a wide range of variations from 508 in Uttar Kashi to 882 in Lucknow, whereas the state average is accounted for 726. Twenty-seven districts out of sixty-three are below the state average. Eleven districts are observed under high to very high index of 768 to 882. These eleven districts of

Saharanpur (768), Hardwar (768), Muzaffarnagar (790), Meerut (793), Ghaziabad (793), Bijnor (836), Moradabad (826), Nainital (814), Rampur (836), Bareilly (774) and Budaun (788) districts combinedly constitute a compact region in northwestern part of the state. Three small patches of this grade comprised of two districts each lie in the western, central and southwestern part of the state. The southern districts of the plain and the majority of the plateau districts constitute a big region of median to high grade of (733 - 768) child-woman ratio. In the immediate north of this region a discontinuous region of median to low grade of (733 - 673) child-woman ratio is found. Shahjahanpur (722), Kheri (695), Sitapur (707), Hardoi (731) and Unnao (716) combinedly form a continuous region as shown in Fig.31, it is separated by Kanpur (Nagar and Dehat) and Gorakhpur from central and extreme eastern districts. As many as about fifteen districts fall under the low to very low grade of (673-508) of child-woman ratio form two recognizable regions : one lies mainly in the Himalayan zone to include six districts out of eight and the other in the north part of the eastern half of the plain (Fig.31).

Rural/Urban Distribution

The rural child-woman ratio is vertually the same to that of the general child-woman ratio. It varies from a minimum of 504 in Uttar Kashi to a maximum of 898 in Bijnor

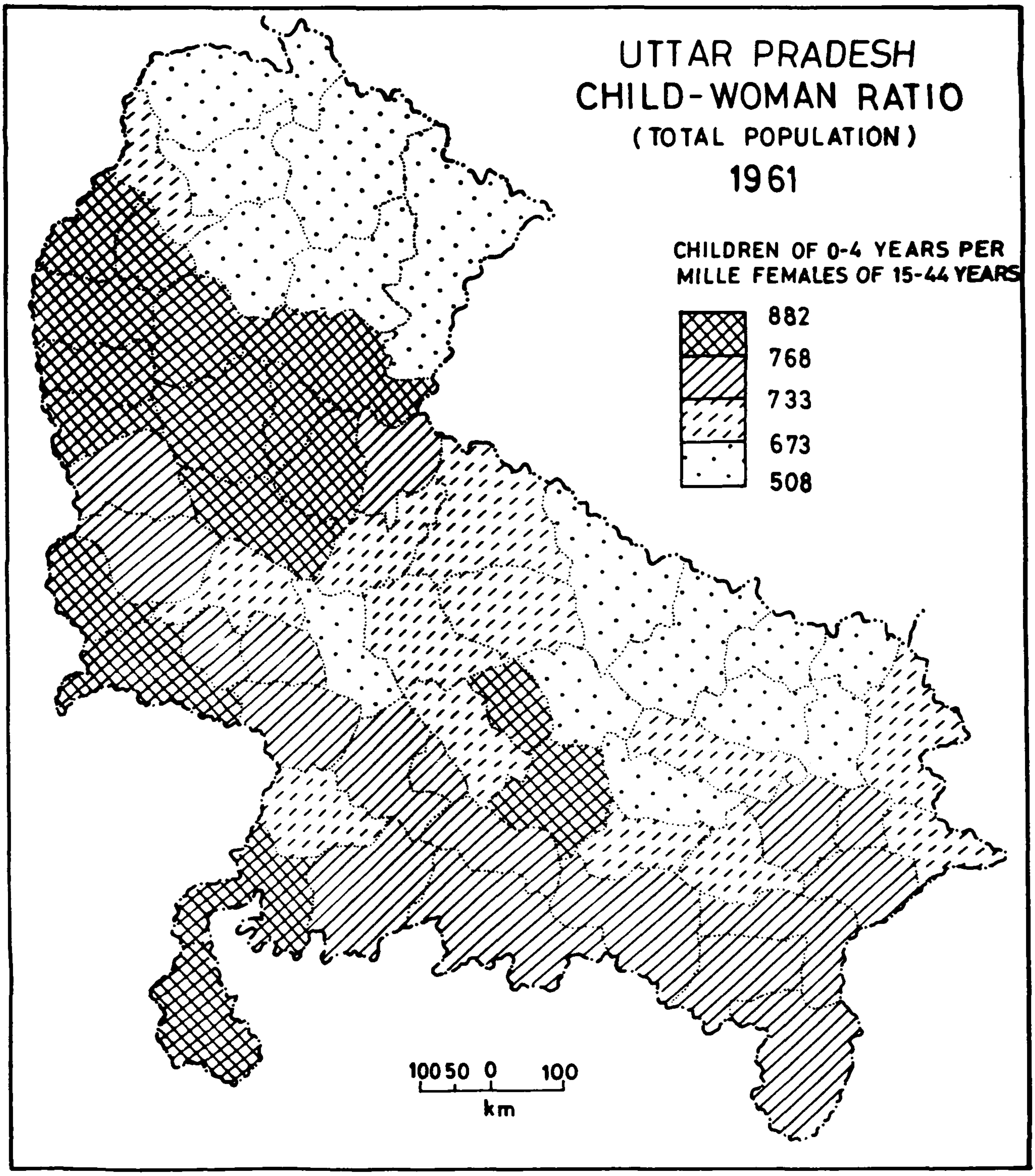

UTTAR PRADESH
CHILD-WOMAN RATIO
(TOTAL POPULATION)
1961
CHILDREN OF 0-4 YEARS PER MILLE FEMALES OF 15-44 YEARS
882
768
733
673
508
100 50 0 100
km

FIG. 31

with the state average of 722. The districtwise rural child-woman ratio is arranged into quartiles of high to very high (764 to 898), high to median (764 to 733), median to low (733 to 662) and low to very low (662 to 504) grades. In the range of 764 to 898 rural child-woman ratio, three-fourths districts of this grade form a big region in the western part. These districts are Muzaffarnagar (788), Meerut (795), Ghaziabad (795), Bijnor (898), Moradabad (822), Nainital (819), Rampur (858), Bareilly (774), Budaun (786), Aligarh (764), Mathura (789) and Agra (810). Remaining four districts of this slab are found in the plateau zone. About eighty-eight per cent of the districts of high to median grade form a peculiar region in the southern half of the state. Median to low grade region is located in the north of the former region of relatively high rural child-woman ratio (Fig.32). Fig. shows that the districts of low to very low child-woman ratio in rural population form two identifiable regions. One is formed in the Himalayan zone to include the districts of Uttar Kashi (504), Chamoli (599), Tehri Garhwal (597), Garhwal (633), Almora (637) and Pithoragarh (547) and the other lies in the northeastern part of the state. It comprises the districts of Sultanpur (659), Barabanki (661), Gonda (657), Basti (643), Siddharthnagar (643), Gorakhpur (620), Maharajganj (620) and Deoria (616) (Table 08).

TABLE 08

CHILD-WOMAN RATIO (No. of children of 0-4 years per mille female population of 15-44 years) BY DISTRICTS IN UTTAR PRADESH, 1961-91

District	1961			1971			1981			1991		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Uttar Kashi	508	504	525	526	522	669	617	580	606	605	575	600
Chamoli	599	599	N.U.P.	616	244	823	586	589	567	577	580	559
Tehri Garhwal	600	597	671	661	660	722	620	626	450	609	619	444
Dehradun	693	719	659	681	644	727	539	618	464	529	609	458
Garhwal	639	633	775	655	652	889	642	650	556	635	638	542
Pithoragarh	547	547	N.U.P.	648	649	645	609	614	504	600	609	500
Almora	638	637	654	663	220	590	616	625	442	608	620	439
Nainital	814	819	793	796	513	651	704	742	610	699	729	600
Bijnor	836	898	850	873	890	801	804	814	777	799	800	768
Moradabad	826	822	839	858	889	763	808	844	719	800	829	700
Rampur	836	858	752	842	528	533	793	872	607	788	863	600
Saharanpur	768	757	804	772	808	875	375	725	803	370	717	798
Hardwar	768	757	804	772	808	875	375	725	803	370	717	798
Muzaffarnagar	790	788	797	852	850	865	685	698	640	679	688	630
Meerut	793	795	781	814	400	736	709	744	640	698	730	632
Ghaziabad	793	795	781	814	400	736	711	731	648	700	722	631
Bulandshahr	758	753	787	835	836	825	741	353	715	729	350	700
Aligarh	752	764	693	838	870	703	700	812	626	682	800	616
Mathura	792	789	804	905	915	849	715	739	633	700	722	622
Agra	798	810	776	817	865	736	667	758	539	653	742	529
Firozabad	737	734	763	762	759	802	678	691	579	669	689	555
Etah	725	718	796	874	870	959	683	691	635	666	679	628
Mainpuri	737	734	763	762	759	802	678	691	579	669	689	555
Budaun	788	786	362	834	845	736	744	748	721	732	733	711
Bareilly	774	774	771	882	879	894	772	839	631	762	822	619
Pilibhit	760	758	769	790	819	624	791	808	680	783	799	663
Shahjahanpur	722	716	756	728	758	581	730	645	506	713	636	497
Kheri	695	695	705	824	736	542	714	723	633	701	718	621
Sitapur	707	704	866	768	775	688	707	704	574	687	685	563
Hardoi	731	731	739	759	775	616	716	723	667	700	709	653
Unnao	716	716	689	747	751	611	643	644	630	621	618	611
Lucknow	882	700	663	654	889	623	557	658	479	543	639	461

TABLE 08 (Contd.)

Rae Bareli	875	673	757	681	680	711	664	668	608	657	658	594
Farrukhabad	635	629	683	750	768	679	704	715	647	699	700	636
Etawah	754	750	792	452	453	730	713	722	649	703	719	638
Kanpur Dehat	733	761	697	750	680	360	622	700	548	620	689	532
Kanpur Nagar	733	761	697	750	680	360	622	700	548	620	689	532
Jalaun	694	733	820	839	850	806	675	701	572	660	689	563
Jhansi	789	775	836	817	540	751	676	698	643	659	688	636
Lalitpur	789	775	836	817	540	751	777	791	683	669	787	672
Hamirpur	756	755	774	891	900	805	693	708	622	683	698	613
Banda	756	754	775	842	849	764	722	736	621	703	720	609
Fatehpur	745	744	783	752	331	725	696	700	656	683	687	648
Pratapgarh	700	697	715	680	645	686	662	659	704	635	642	679
Allahabad	732	734	721	742	755	682	699	737	561	680	711	549
Bahraich	664	662	680	617	610	732	725	728	681	703	704	663
Gonda	659	657	706	652	655	608	689	685	736	670	668	718
Barabanki	664	661	729	693	693	343	646	642	692	633	631	685
Faizabad	673	671	694	678	680	650	647	651	615	632	636	600
Sultanpur	661	659	748	632	638	717	668	654	600	660	630	590
Siddharthnagar	643	643	690	710	710	707	687	685	735	653	650	700
Maharajganj	663	620	741	713	715	690	694	707	590	683	690	580
Basti	643	643	690	710	710	707	687	685	735	653	650	700
Gorakhpur	663	620	741	713	715	690	694	707	590	683	690	580
Deoria	996	616	709	704	704	685	725	724	741	700	699	720
Mau	733	729	819	719	720	708	699	698	705	678	676	693
Azamgarh	733	729	819	719	720	708	699	698	705	678	676	693
Jaunpur	702	699	742	693	687	793	704	699	768	691	683	732
Ballia	694	695	686	651	645	748	646	656	633	622	632	618
Ghazipur	740	740	732	659	650	751	680	683	646	660	662	623
Varanasi	737	741	725	695	632	699	695	714	645	680	700	630
Mirzapur	767	773	730	874	889	758	715	717	700	699	705	688
Sonbhadra	767	773	730	874	889	758	715	717	700	699	705	688
Uttar Pradesh	726	722	749	752	759	709	694	711	621	654	686	620

Source - Calculation is based on published data obtained from Census of India 1961, Uttar Pradesh, Cultural and Migration Tables ; Census of India 1971 and 1981, Uttar Pradesh, Social and Cultural Tables ; and Census of India 1991, Final Population Totals : Brief Analysis of Primary Census Abstract.
The data of some of the districts were not available, they had been adjusted from the previous records and the data of adjacent districts.

N.U.P. - Not Urban Population

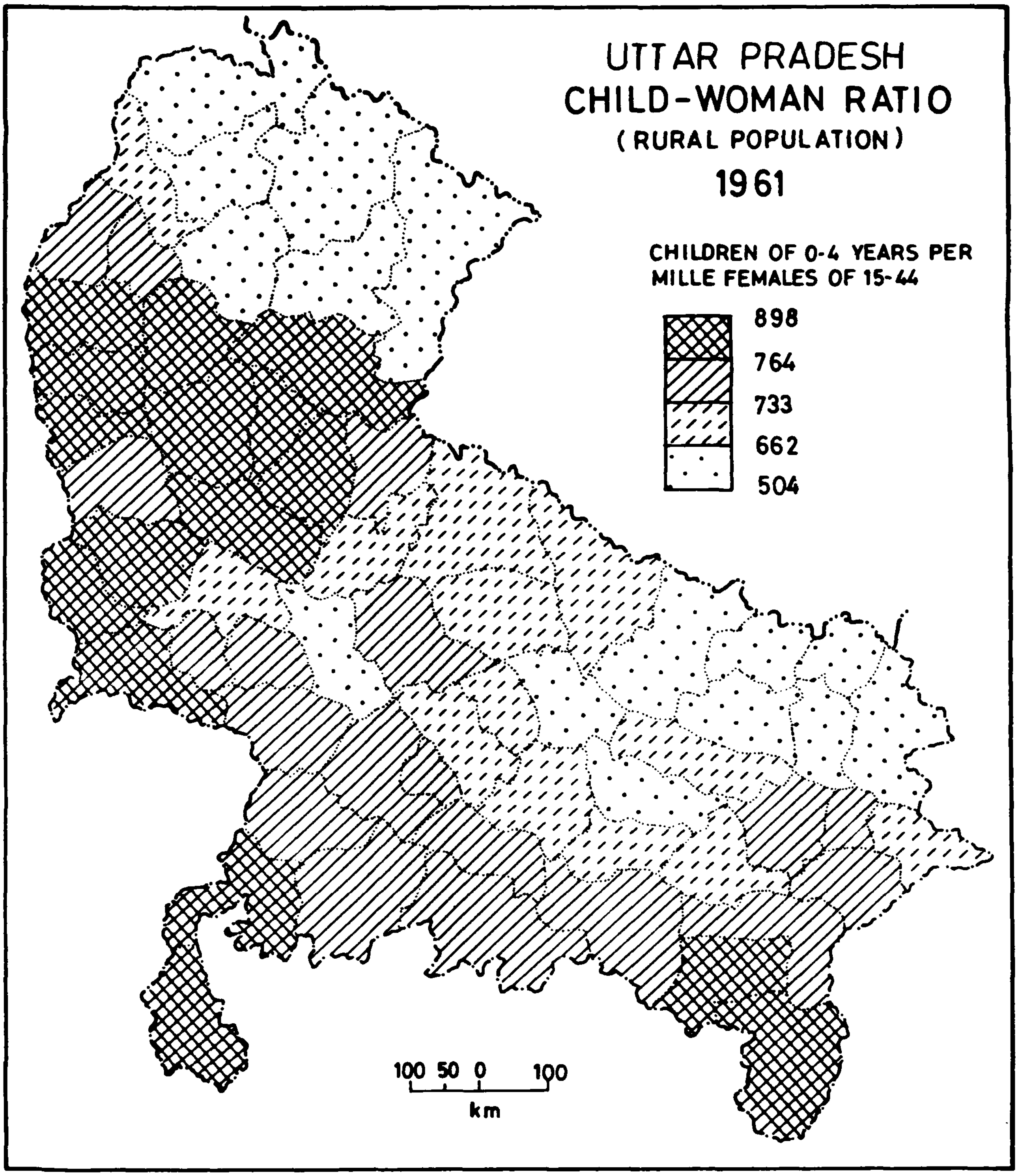
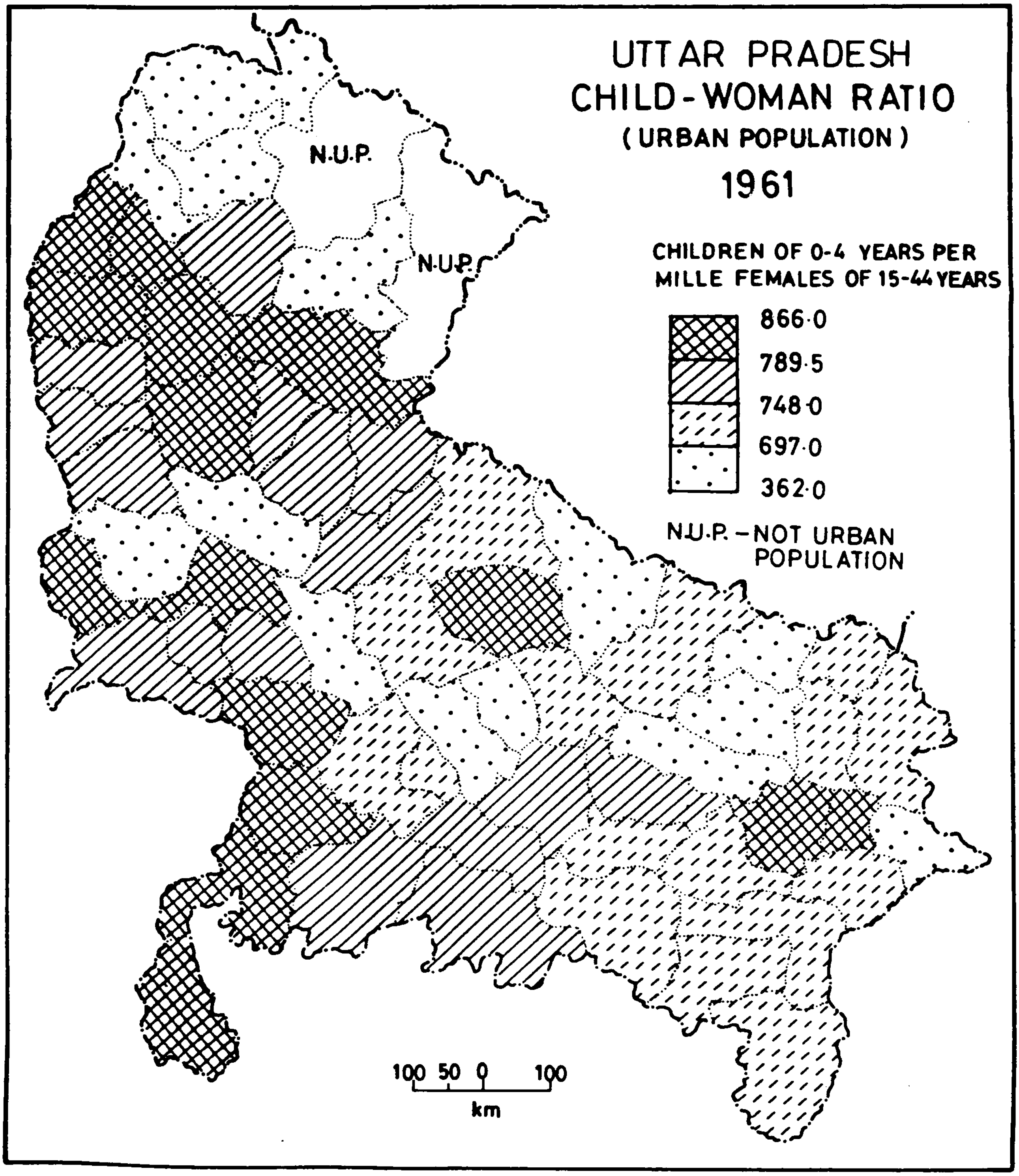

UTTAR PRADESH
CHILD-WOMAN RATIO
(RURAL POPULATION)
1961
CHILDREN OF 0-4 YEARS PER MILLE FEMALES OF 15-44
898
764
733
662
504
100 50 0 100
km

FIG.32

The range of variation in the urban child-woman ratio is much higher than that of rural child-woman ratio. The highest child-woman ratio is recorded in Sitapur (866), whereas Budaun (362) is at the bottom of the scale and the state average accounts for 749. The data thus obtained are grouped into quartiles as shown in Fig.33. Six north-western districts form a compact region of high to very high urban child-woman ratio (789.5 - 866.0). But a dis-continuous region of this slab is observed on the western margin of the state stretching from Saharanpur in the north to Lalitpur in the south. The districts which are under the grade of median to high child-woman ratio (748.0 - 789.5) in urban population form two regions. One comprises the some of the central plain districts and the plateau districts. These districts against their child-woman ratio are Hamirpur (774), Banda (775), Fatehpur (783), Rae Bareli (757) and Sultanpur (748). The other is found to be a discontinuous region interrupted by Moradabad and Farrukhabad located in the western part. It includes the districts of Agra (776), Firozabad (763), Mainpuri (763), Rampur (752), Bareilly (771), Pilibhit (769), Shahjahanpur (756), Bulandshahr (787), Meerut and Ghaziabad (781). One big contiguous region is formed by the districts of Pratapgarh, Allahabad, Jaunpur, Ghazipur, Varanasi, Mirzapur and Sonbhadra which lies in the southeastern part of the state under the low to



UTTAR PRADESH
CHILD-WOMAN RATIO
(URBAN POPULATION)
1961
CHILDREN OF 0-4 YEARS PER MILLE FEMALES OF 15-44 YEARS
866·0
789·5
748·0
697·0
362·0
N.U.P. – NOT URBAN POPULATION
N.U.P.
N.U.P.
100 50 0 100
km

FIG. 33

median grade of child-woman ratio (697-748). Other discontinuous region interrupted by Siddharthnagar and Sitapur located in the Tarai belt and central plain respectively, comprises the districts of Deoria, Maharajganj, Gonda, Barabanki, Kheri, Hardoi, Kanpur Dehat and Kanpur Nagar. Three distinct but small regions of low to very low (697 - 362) child-woman ratio are identified : one lies in the Himalayan zone, second in west plain and third in the northeastern part of the state. The former is composed of Uttar Kashi, Dehradun and Tehri Garhwal with child-woman ratio of 525, 659 and 671 respectively, second is constituted by Aligarh (693), Budaun (362) and Farrukhabad (683), and the third is delimited by the districts of Faizabad, Basti and Siddharthnagar.

Child-Woman Ratio 1971

General Distribution

The child-woman ratio is substantially high in the majority of the districts yet there are few districts which stand out as bold exceptions to this general pattern. Sixty three districts have child-woman ratio between the minimum of 452 in Etawah and the maximum of 905 in Mathura. On the basis of this sufficiently wide range of variations the ratio may be divided into quartiles of 452 to 681, 681 to

750, 750 to 824 and 824 to 905. In the regional patterns one big region is found in the northwestern part under the high to very high grade (824-905) of child-woman ratio. A discontinuous region of this slab (824-905) is observed on the southern margin of the state. The overwhelming majority of the districts belonged to median to high child-woman ratio form a compact region in the westcentral plain which comprises the districts of Agra (817), Firozabad (762), Mainpuri (762), Farrukhabad (750), Hardoi (759), Sitapur (768), Kanpur Nagar (750), Kanpur Dehat (750) and Fatehpur (752). More than half of the districts of median to low child-woman ratio (750-681) constitute a continuous region in the east plain (Fig.34). Two dominant and distinct regions of low to very low child-woman ratio (681 - 452) are located in the Himalayan section and central part of the state.

Rural/Urban Distribution

The child-woman ratio of rural population varies from a maximum of 915 in Mathura to a minimum of 220 in Almora. Though the interdistricts variation in the child-woman ratio are not very notable but the inter-district variation in respect of rural and urban population is relatively more significant and notable. Even the state averages of the child-woman ratio in the rural and urban

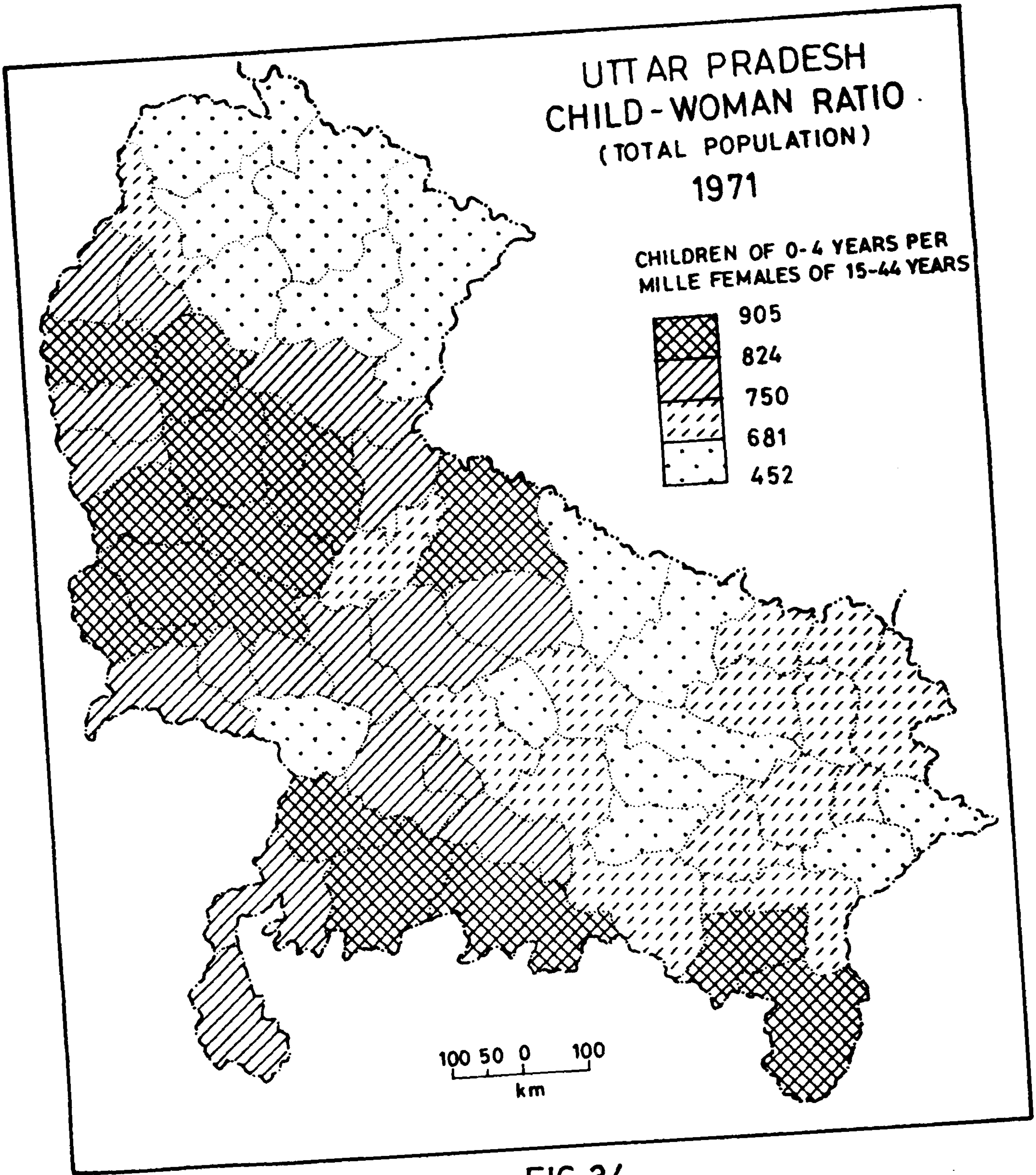

UTTAR PRADESH
CHILD-WOMAN RATIO
(TOTAL POPULATION)
1971
CHILDREN OF 0-4 YEARS PER
MILLE FEMALES OF 15-44 YEARS
905
824
750
681
452
100 50 0 100
km

FIG.34

population are distinctly different. The average for the rural child-woman ratio is 759 and for urban child-woman ratio is 709. Like the averages, the rural/urban range of variations are also considerably different. The district-wise rural child-woman ratio is arranged into quartiles of high to very high (836 - 915), high to median (836 - 715), median to low (715 - 645) and low to very low (645 - 220) grades. The graded distribution of child-woman ratio in rural population, as given in Fig. 35, shows that an overwhelming majority of the districts of west plain have their values more than that of the state average (759) and form a distinct region of the high to very high grade of child-woman ratio. The other is found to be a discontinuous region in the southern part, it includes the plateau districts and is interrupted by Allahabad a district of median to high grade of child-woman ratio. Two distinct regions are delimited under high to median grade of child-woman ratio. One lies in the westcentral plains and comprises the districts of Firozabad (759), Mainpuri (759), Farrukhabad (768), Shahjahanpur (758), Pilibhit (819), Kheri (736), Sitapur (775), Hardoi (775) and Unnao (751). Other in the east plain and includes the districts of Maharajganj (715), Gorakhpur (715), Mau (720) and Azamgarh (720). More than half of the districts of eastern part forms a big continuous region of median to low child-woman ratio (Fig.35).

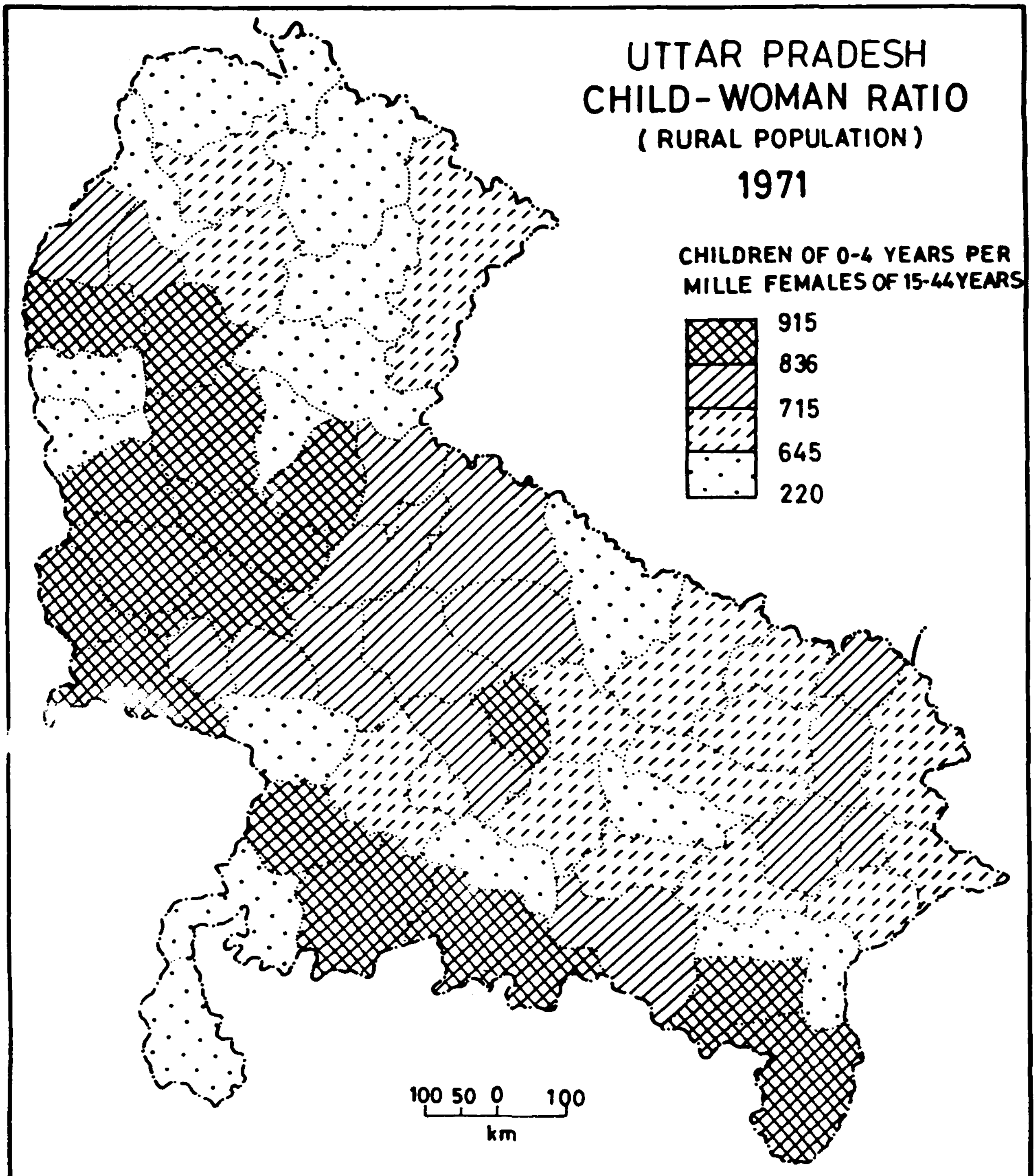

UTTAR PRADESH
CHILD-WOMAN RATIO
(RURAL POPULATION)
1971
CHILDREN OF 0-4 YEARS PER MILLE FEMALES OF 15-44 YEARS
915
836
715
645
220
100 50 0 100
km

FIG. 35

One district of west plain (Rampur) and five districts of the Himalayan section (Dehradun, Uttar Kashi, Chamoli, Almora and Nainital) constitute an identifiable region of low to very low grade of child-woman ratio.

Regional distribution of urban child-woman ratio varies within the range of 343 to 959 with the minimum in Barabanki and the maximum in Etah. The urban child-woman ratio is observed to be lower than that of the rural child-woman ratio and its range of interdistricts variations is relatively wide. It will be seen from Fig.36 that the districts of high to very high (764 - 959) urban ratio delimit a discontinuous region, interrupted by Moradabad, Aligarh and Etawah, on almost the northwestern and southern margins of the state. It includes the districts of Chamoli (823), Garhwal (889), Bijnor (801), Muzaffarnagar (865), Hardwar (875), Saharanpur (875), Bulandshahr (825), Mathura (849), Etah (959), Firozabad (802), Mainpuri (802), Jalaun (806), Hamirpur (805) and Banda (764). The districts falling under the grade of high to median ratio (764 - 722) are found to occur in scattered pattern however, four districts of them form a small region in the west plain to include the districts of Meerut (736), Ghaziabad (736), Moradabad (763) and Budaun (736). More than seventy-six per cent districts of median to low (722 - 669) child-woman ratio constitutes a discontinuous region, interrupted by a

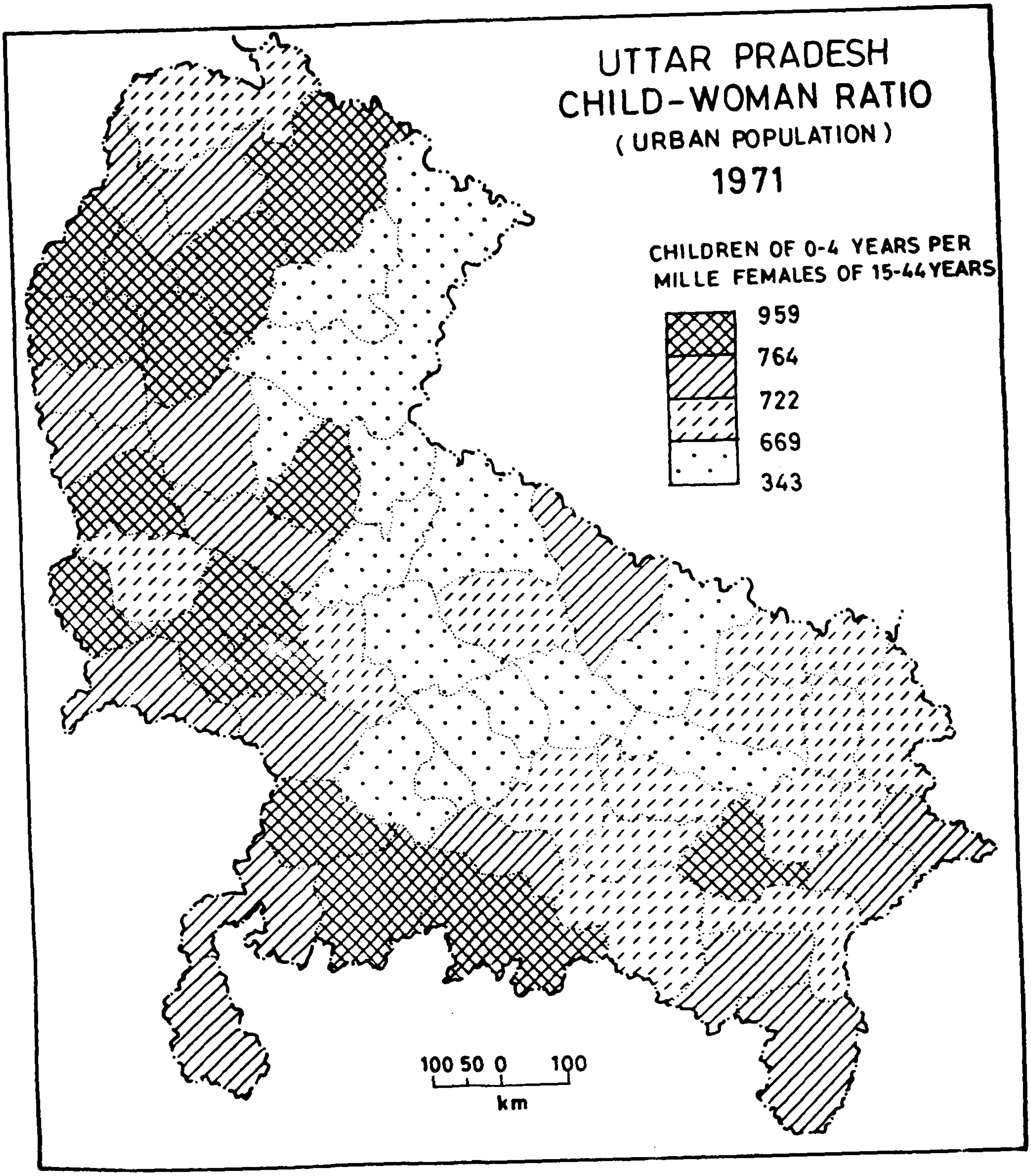

UTTAR PRADESH
CHILD-WOMAN RATIO
(URBAN POPULATION)
1971
CHILDREN OF 0-4 YEARS PER MILLE FEMALES OF 15-44 YEARS
959
764
722
669
343
100 50 0 100
km

FIG.36

district of Jaunpur, in the eastern part of the state. One dominant narrow belt of low to very low (669 - 343) child-woman ratio is formed which stretches from Pithoragarh in north to Faizabad in east (Fig.36).

Child-Woman Ratio 1981

General Distribution

The range of variation in child-woman ratio is observed from 375 in Saharanpur to 808 in Moradabad, whereas the state average is 694 (Table 08). The distribution is arranged ito quartiles of 375 to 647, 647 to 694, 694 to 715 and 715 to 808 child-woman ratios. The districts of high to very high (715 - 808) child-woman ratio are almost found in west plain where they form a dominant region comprised of Bijnor (804), Moradabad (808), Rampur (793), Bareilly (772), Pilibhit (791), Shahjahanpur (730), Hardoi (716), Budaun (744) and Bulandshahr (741) districts. Remaining districts of Mathura, Lalitpur, Banda, Bahraich, Deoria, Mirzapur and Sonbhadra are scattered and situated on the outlier of the state. A distinct region of the high to median (715 - 694) child-woman ratio is constituted in the southeastern part of the state. Three other small regions are formed by two districts. One and second lie in the west plain and third in the Tarai belt of the state (Fig.37).

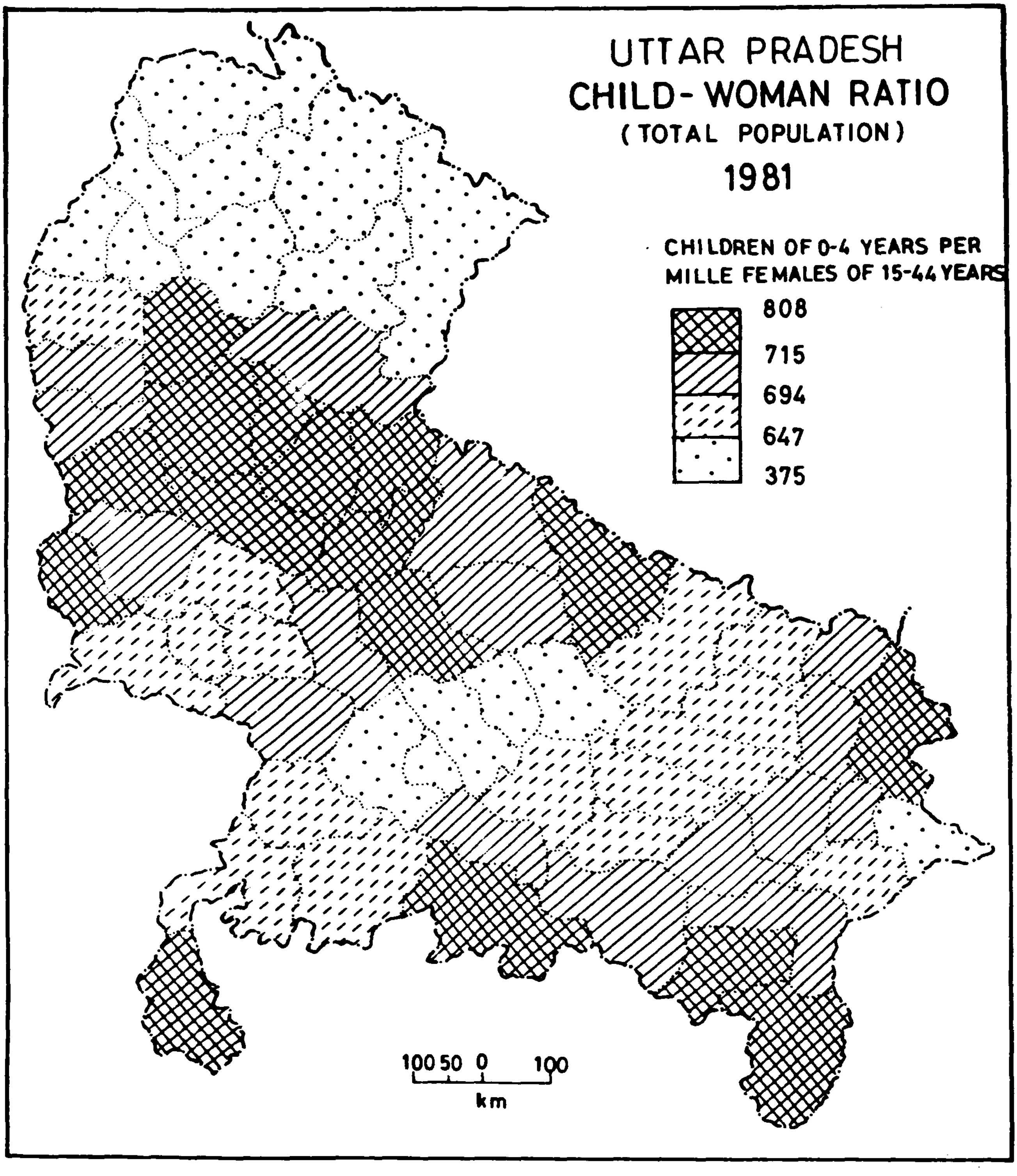

UTTAR PRADESH
CHILD-WOMAN RATIO
(TOTAL POPULATION)
1981
CHILDREN OF 0-4 YEARS PER MILLE FEMALES OF 15-44 YEARS
808
715
694
647
375
100 50 0 100
km

FIG. 37

There exist three regions under the median to low (694-647) child-woman ratio which lie in west plain, plateau region, centraleast plain. If Fatehpur and Etawah districts were not fallen under the high to median grade, then these three regions would have emerged as a single dominant distinct region. The districts of the bottom slab of child-woman ratio form two distinct regions. One lies in the northern part of the state and includes the districts of Saharanpur (375), Hardwar (375), Dehradun (539), Chamoli (586), Uttar Kashi (617), Tehri Garhwal (620), Garhwal (642), Almora (616) and Pithoragarh (609). The other which includes Kanpur Dehat (622), Kanpur Nagar (622), Unnao (643), Lucknow (557) and Barabanki (646) lies in the central part of the state.

Rural/Urban Distribution

Though the child-woman ratio for the general and the rural population are almost the same, they are considerably low in the urban population. The break-up of child-woman ratio in terms of rural and urban varies respectively from 353 to 872 and from 442 to 803. The respective averages for the state are 711 and 621. The most prominent region comprising sixty-eight per cent districts of high to very high (728 - 872) child-woman ratio is found in the western part and includes ten districts of west plain and one district of the Himalayan section (Fig.38). Under high to median grade of (728-700) child-woman ratio, one discontinuous region interrupted by Allahabad district is located vertically in the state, it runs from Kheri to Sonbhadra as shown in Fig.38. Other small region of the similar grade lies in the extreme eastern part and comprises three districts of Maharajganj, Gorakhpur and Deoria. A distinct region of median to low (700-659) child-woman ratio are found in the eastern part and includes the districts of Rae Bareli (668), Pratapgarh (659), Jaunpur (699), Azamgarh (698), Mau (698), Ghazipur (683), Siddharthnagar (685), Basti (685) and Gonda (685). Other small region of this grade of child-woman ratio, but of small size lies in the west plain and comprises three districts of Etah (691), Firozabad (691) and Mainpuri (691). Two dominant regions of under low to very low (659-353) child-woman ratio are identified : one is observed in the Himalayan section and other in central part of the state (Fig.38).

The child-woman ratio of urban population as shown in Table 08 indicates a very wide range of variations, it differs within the range of 442 to 803. It will be seen that even the urban maximum index is lower than the rural average for the state. The pattern of distribution of child-woman ratio in urban area may be arranged into the grades of quartiles of high to very high (700-803), high to

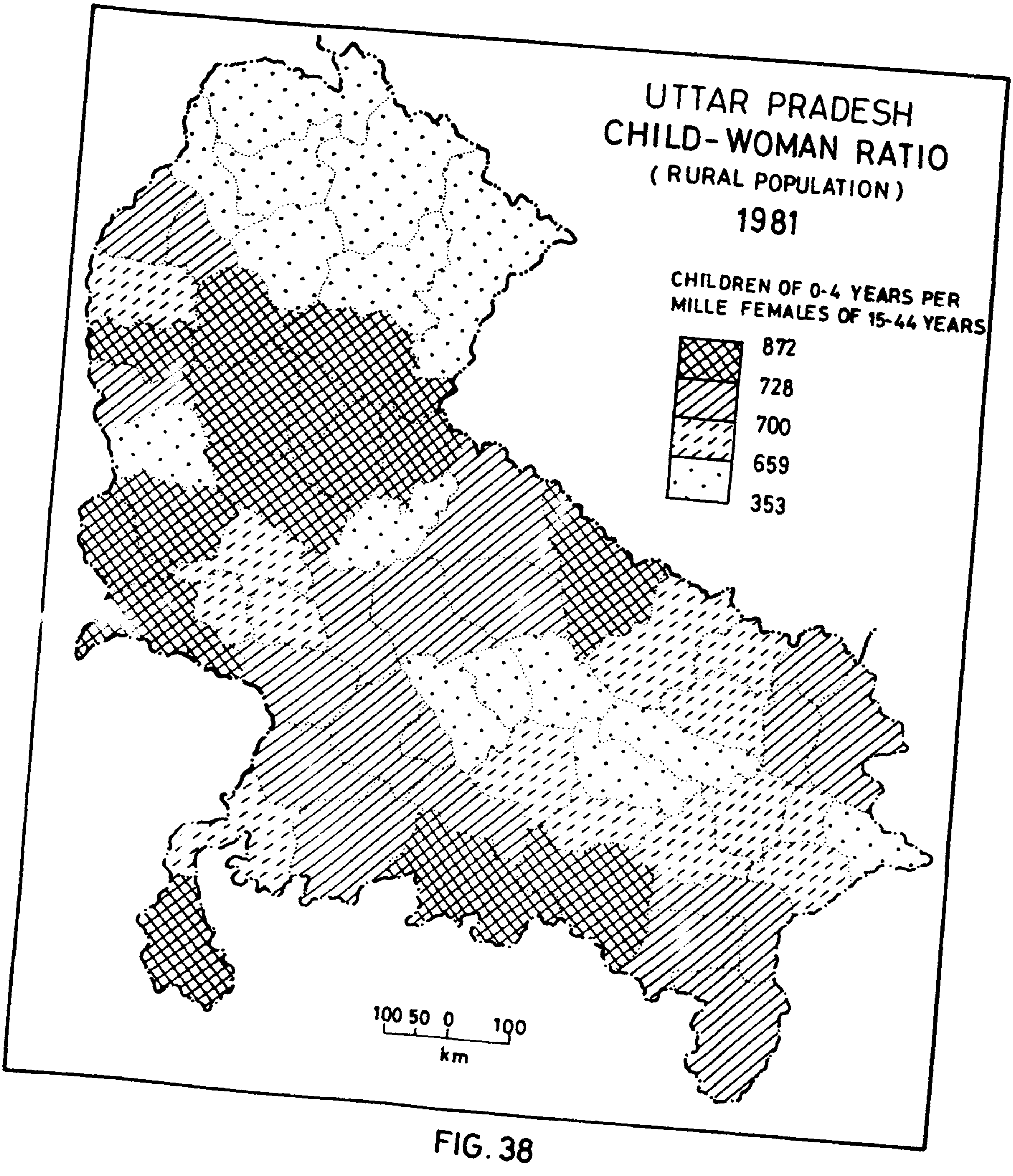

UTTAR PRADESH
CHILD-WOMAN RATIO
(RURAL POPULATION)
1981
CHILDREN OF 0-4 YEARS PER
MILLE FEMALES OF 15-44 YEARS
872
728
700
659
353
100 50 0 100
km

FIG. 38

median (700-633), median to low (633-579) and low to very low (579-442). Similarly, the districts having child-woman ratio higher than the state average of 621 and lie under high to very high child-woman ratio form a dominant region in the western part and comprises the districts of Saharanpur (803), Hardwar (803), Bijnor (777), Moradabad (719), Budaun (721) and Bulandshahr (715). The other is found to be a discontinuous region interrupted by Faizabad and Varanasi districts, located in eastern part of the state. It includes the districts of Pratapgarh (704), Jaunpur (768), Azamgarh (705), Mau (705), Deoria (741), Basti (735), Siddharthnagar (735), Gonda (736), Mirzapur (700) and Sonbhadra (700). It may be readily seen from the map that a distinct region is formed under high to median grade of child-woman ratio, it comprises some of the west plain and central plain districts. Three other small regions belong to the same grade. One lies in the west plain and comprises the districts of Muzaffarnagar (640), Meerut (640) and Ghaziabad (648), second lies in the east plain and includes the districts of Varanasi (645), Ghazipur (646) and Ballia (633) and third in the plateau section which comprises only two districts of Jhansi (643) and Lalitpur (683). A continuous narrow belt of the grade of median to low child-woman ratio is found in the eastern half of the plain and comprises the districts of Unnao (630),

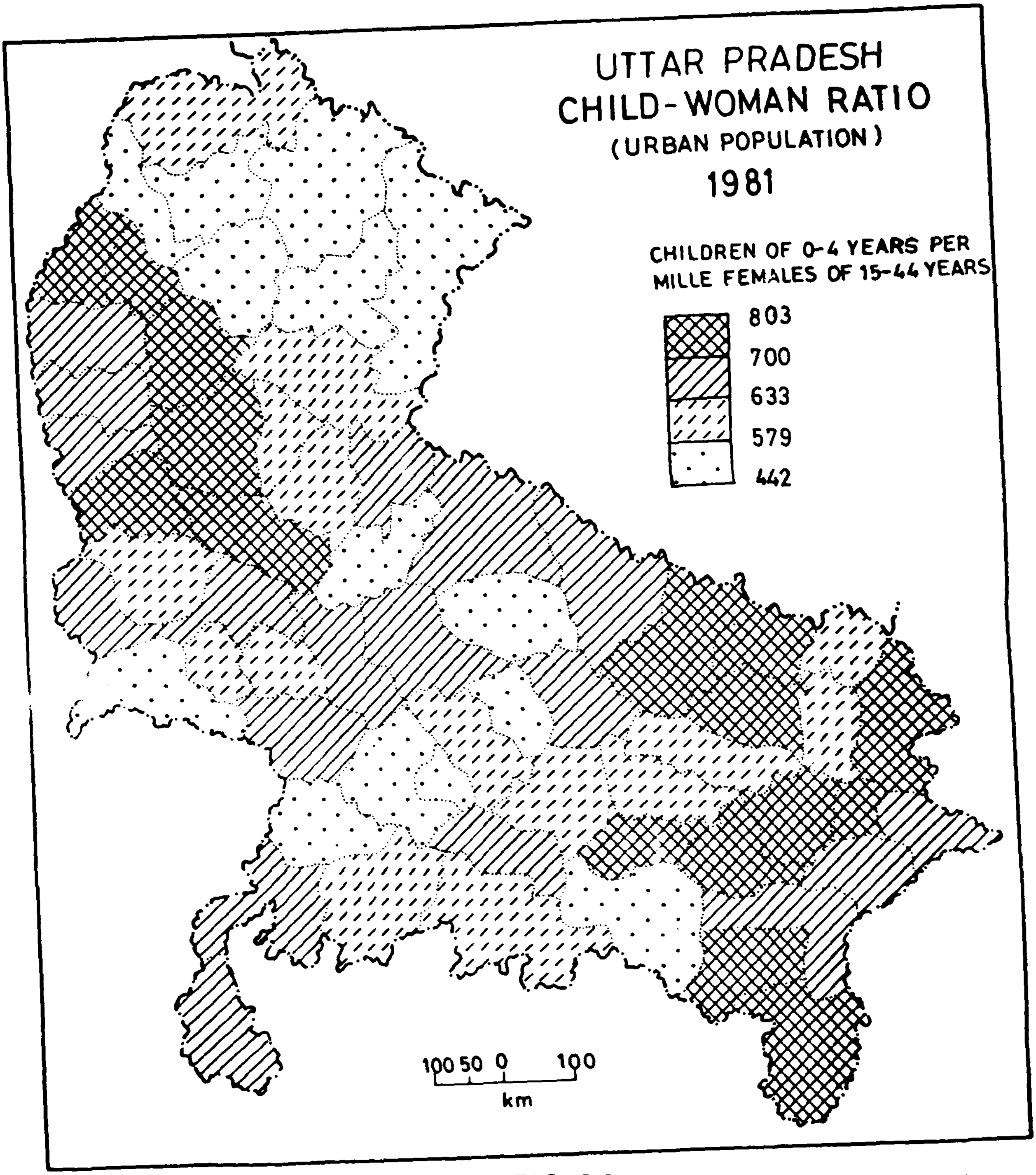

UTTAR PRADESH
CHILD-WOMAN RATIO
(URBAN POPULATION)
1981
CHILDREN OF 0-4 YEARS PER MILLE FEMALES OF 15-44 YEARS
803
700
633
579
442
100 50 0 100
km

FIG.39

Rae Bareli (608), Sultanpur (600), Faizabad (615), Gorakhpur (590) and Maharajganj (590). A small patches of this slab are located in the western part of the state. Six districts of the Himalayan section form an identifiable region of low to very low grade of child-woman ratio. Jalaun, Kanpur Dehat and Kanpur Nagar districts of the same grade form a small region in almost the central part of the state (Fig.39).

Child-Woman Ratio 1991

General Distribution

The child-woman ratio is considered to be a useful index of human fertility. The regional distribution of child-woman ratio (number of children of 0-4 years per mille females of 15-44 years) varied from 370 in Saharanpur and Hardwar to 800 in Moradabad giving the state an average of 654. Table 08 shows that only about one-third districts had child-woman ratio below state average. There were sharp variations at both sides of the scale.

The distribution of interquartile grades of child-woman ratio in 1991 revealed some distinct regions. One very dominant zone of high to very high ratio (700-800) was formed in the western plain. Only four districts of this grade (Mathura, Etawah, Banda and Deoria) were far a part therefore, they failed to delimit any identifiable region.

Median to high grade of (678-700) child-woman ratio districts formed a continuous belt like crescent in south and eastern parts stretched from Hamirpur in southwest to Maharajganj and Gorakhpur in the northeast. Other six districts of the similar slab found to be scattered almost over central and western plains of the state. They against their child-woman ratios, were Aligarh (682), Muzaffarnagar (679), Meerut (698), Sitapur (687), Nainital (699) and Farrukhabad (699). The districts of median to low (678-635) child-woman ratio formed four mini regions each in the western, central and eastern plains, and the plateau zone. The western region comprised of Etah (666), Agra (653), Firozabad (669) and Mainpuri (669) districts, the central region included Sultanpur (660), Pratapgarh (635) and Rae Bareli (657), and the eastern region was composed of Gonda (670), Siddharthnagar (653) and Basti (653). Three districts of Lalitpur, Jhansi and Jalaun formed a small belt of median to low ratio in the southern part of the state (Fig.40).

A very clear picture emerged from the districts belonged to the slab of low to very low child-woman ratio of 635 to 370. Two regions of this grade were discernible. One lay in the northern part which included six Himalayan districts out of eight and two western plain districts of Saharanpur and Hardwar. Other composed of six districts -

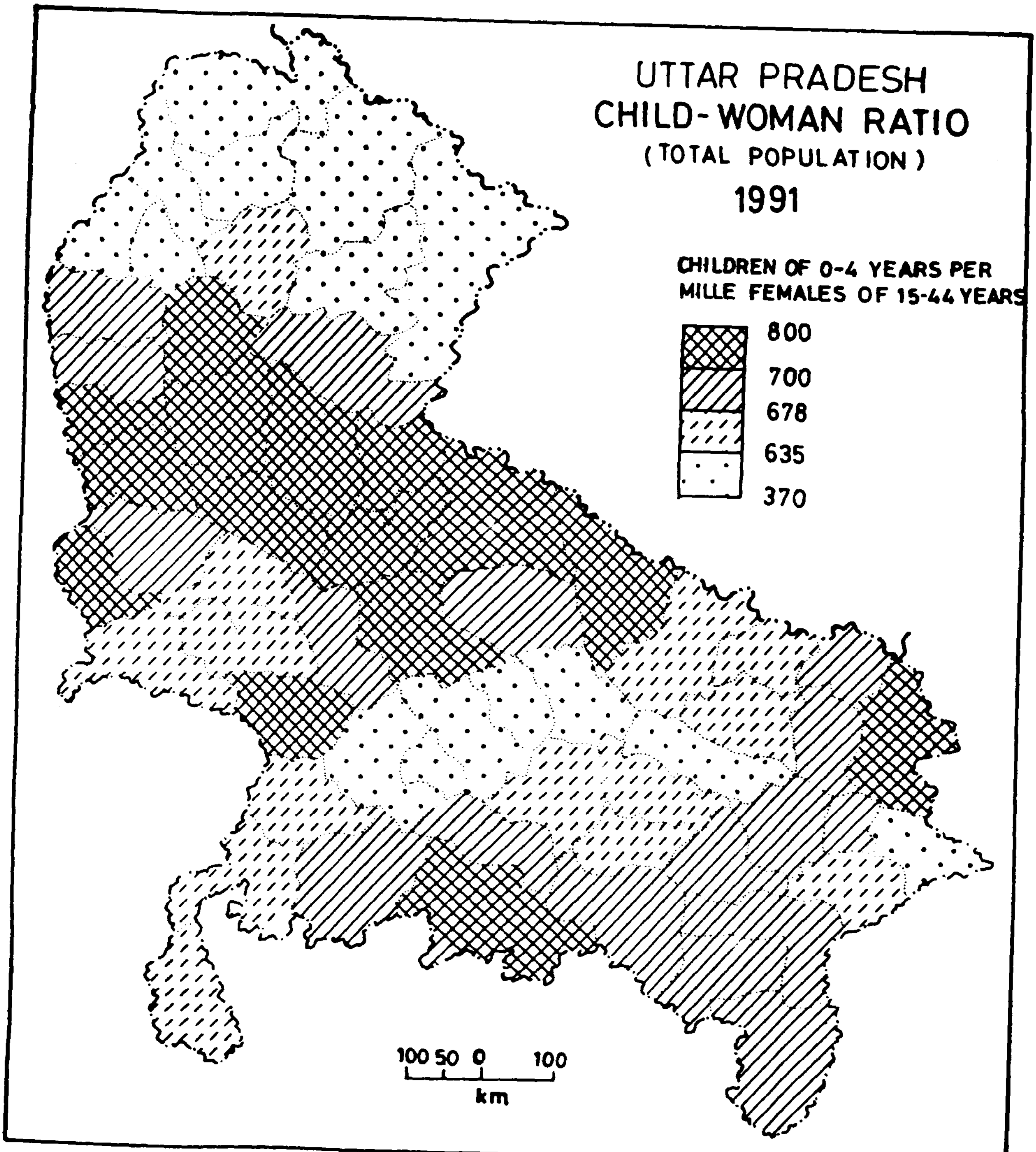

UTTAR PRADESH
CHILD-WOMAN RATIO
(TOTAL POPULATION)
1991
CHILDREN OF 0-4 YEARS PER
MILLE FEMALES OF 15-44 YEARS
800
700
678
635
370
100 50 0 100
km

FIG.40

Kanpur Dehat, Kanpur Nagar, Unnao, Lucknow, Barabanki and Faizabad, constituted a distinct region over the central part of Uttar Pradesh.

Rural/Urban Distribution

The Child-woman ratio of rural areas during 1991 varies from 350 Bulandshahr to 863 in Rampur districts, whereas state average accounts for 686 which is lesser than the previous decadal year (711). All the districts of the state may be arranged into quartiles of high to very high (718-863), high to median (718-689), median to low (689-642) and low to very low (642-350). It may be pointed out that the districts of high to very high grade of child-woman ratio are mainly concentrated in the west plain except the district of Nainital (Fig.41). Only three districts of this grade (718-863) - Lalitpur (787), Banda (720) and Kheri (718) are far a part therefore, they do not constitute any identifiable region. There exist two regions under the high to median grade of child-woman ratio : one lies in south-central part and the other in southeastern part of the state. These two regions are separated by Banda a district of high to very high grade, otherwise these two distinct regions would have emerged as a single dominant continuous region. Other small region is observed in the extreme north-eastern part and comprises the districts of Maharajganj

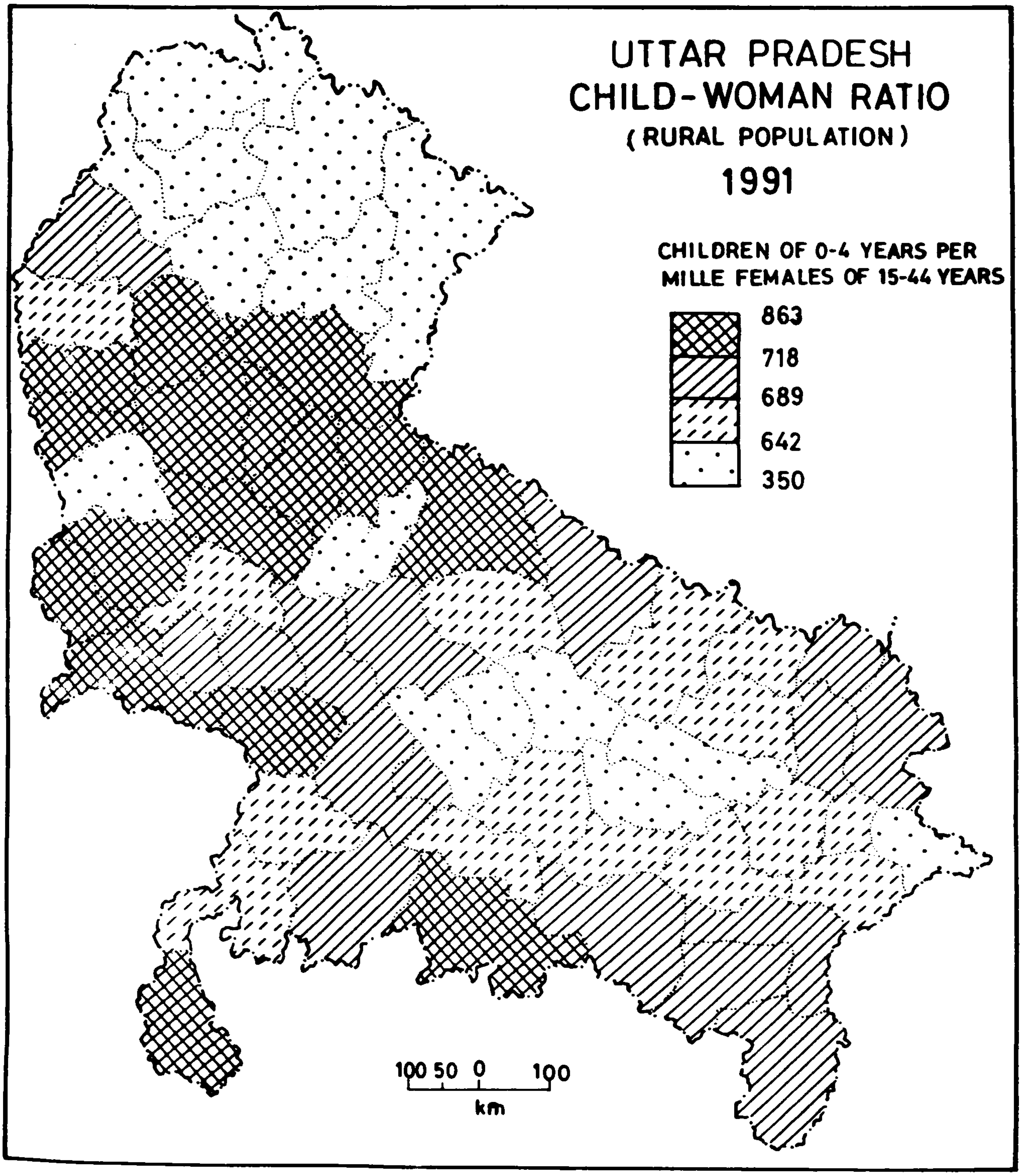

UTTAR PRADESH
CHILD-WOMAN RATIO
(RURAL POPULATION)
1991
CHILDREN OF 0-4 YEARS PER MILLE FEMALES OF 15-44 YEARS
863
718
689
642
350
100 50 0 100
km

FIG. 41

(690), Gorakhpur (690) and Deoria (699). Under the median to low grade of child-woman ratio is found to be a discontinuous region, interrupted by Hamirpur in south and Faizabad in north, located in the plateau section, central and east plains. It includes the districts of Jhansi, Jalaun, Fatehpur, Rae Bareli, Pratapgarh, Jaunpur, Ghazipur, Azamgarh, Mau, Basti, Siddharthnagar and Gonda. Two regions are constituted under low to very low grade of child-woman ratio. One lies in the Himalayan section and comprises the districts of Dehradun, Uttar Kashi, Tehri Garhwal, Garhwal, Chamoli, Almora and Pithoragarh. Other composed of five districts - Unnao, Lucknow, Barabanki, Faizabad and Sultanpur is found in the central part of the state. Three remaining districts of Bulandshahr, Shahjahanpur and Ballia are scattered and they, therefore, do not form any region under the same grade of child-woman ratio.

The urban child-woman ratio differs widely among the districts, it ranges from 439 to 798. Almora records the lowest child-woman ratio (439) and Saharanpur and Hardwar the highest (798). The average child-woman ratio for the state works to be 620, which is almost similar to the previous decadal year 1981. The distribution of child-woman ratio among the districts may be arranged into quartiles of high to very high (685-798), high to median (685-622), median to low (622-563) and low to very low

(563-439) grades. In the regional patterns one distinct region of high to very high grade of child-woman ratio is found in western part to include the districts of Saharanpur (798), Hardwar (798), Bijnor (768), Moradabad (700), Budaun (711) and Bulandshahr (700). The other is found to be a discontinuous region under the same grade interrupted by Faizabad and Varanasi districts, located in the eastern part of the state. It includes the districts of Barabanki (685), Gonda (718), Siddharthnagar (700), Basti (700), Deoria (720), Mau (693), Azamgarh (693), Jaunpur (732), Mirzapur (688) and Sonbhadra (688). Under high to median grade of child-woman ratio, a distinct region is identified in the western part and comprises Mathura, Etah, Farrukhabad, Hardoi and Etawah districts. But a discontinuous region of this slab is observed on the western margin of the state stretching from Muzaffarnagar in the north to Lalitpur in the south (Fig.42). A discontinuous region is also found under the grade of median to low child-woman ratio, interrupted by Pilibhit, Barabanki, and Fatehpur, located in the west and central plains and the plateau section (Fig. 42). A very clear picture is emerged from the districts belonged to the slab of low to very low child-woman ratio. A distinct region is delimited in the Himalayan section to includes the districts of Dehradun, Tehri Garhwal,Garhwal,Chamoli,Almora and Pithoragarh. Remaining

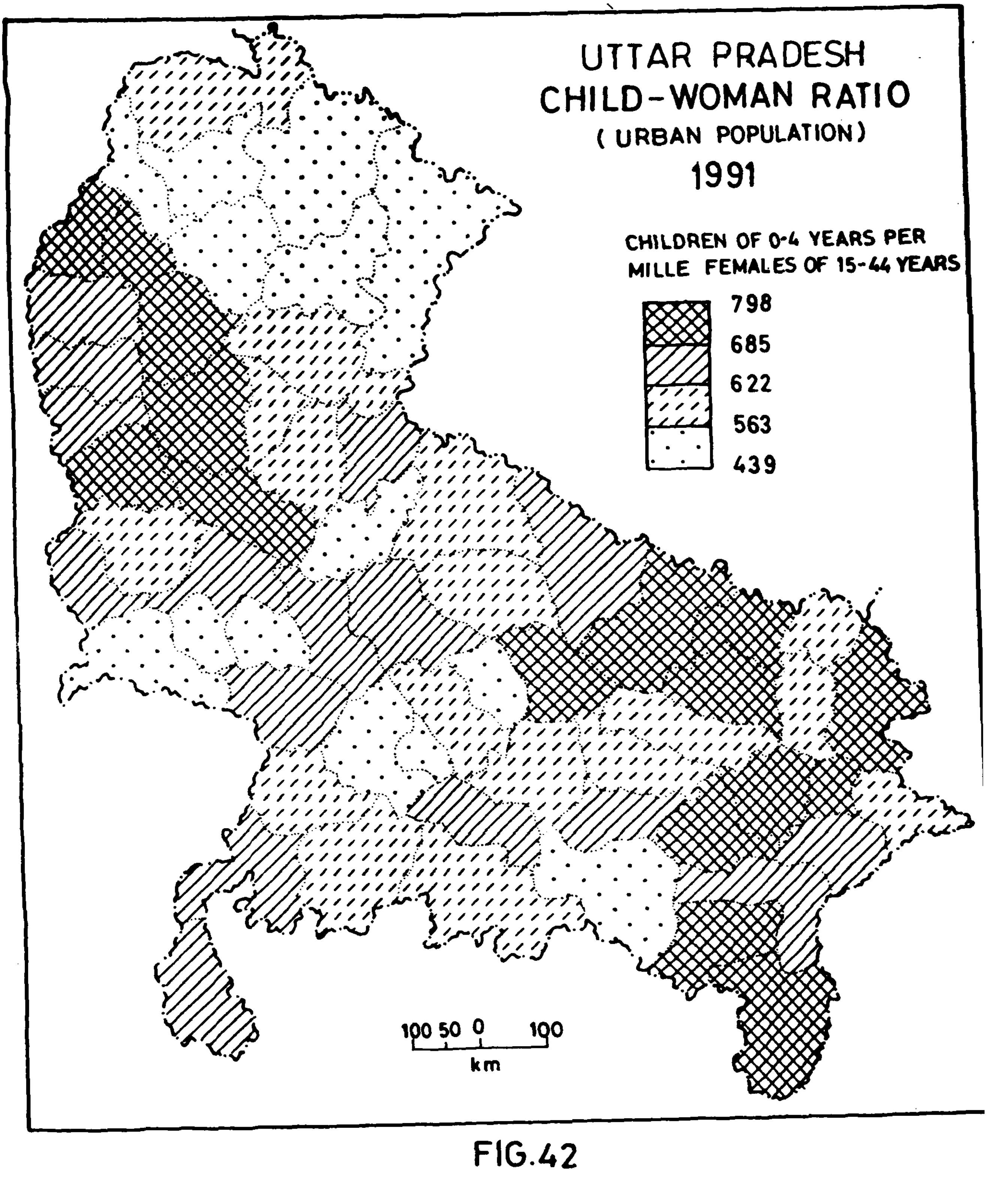

UTTAR PRADESH
CHILD-WOMAN RATIO
(URBAN POPULATION)
1991
CHILDREN OF 0-4 YEARS PER MILLE FEMALES OF 15-44 YEARS
798
685
622
563
439
100 50 0 100
km

FIG.42

three districts form a small region in the western part, they are Agra, Firozabad and Mainpuri. It has been observed that child-woman ratio varies widely from one socio-cultural group to another and from one region to another.[08]

The patterns of spatial distribution of child-woman ratio in Uttar Pradesh during four decadal years (1961-91) depict that in almost all areas child-woman ratios are substantially high in rural population as compared to urban population. This is particularly due to relatively high incidence of rural female employment in agricultural, plantation and allied works. However, in the broad regional context the eastern and western sections of the state present sharp contrast. In rural areas, there is high child-woman ratio because rural areas are relatively more poverty stricken. It may be inferred that low ratio in all areas is mainly due to female engaged in different types of activities, namely, handlooms and cottage industries, and recently developed earthen pottery works have drawn females in substantial numbers.[09] Himalayan region have a low index of child-woman ratio because there are high literacy rate and female educational level is also observed to be higher than that of other parts of the state.

The patterns of rural/urban fertility differentials are largely determined by the standard of living in the rural areas where economic development has hitherto been slow, the improvement of living standards in these areas, unless accompanied by changes in the traditional rural institutions, may lead to further increase in fertility. Higher living standards could also result in the maintenance of high fertility levels in rural areas where substantial improvements in living standards have already been achieved.[10]

FERTILITY REGION

Here two sets of fertility regions - birth rate and child-woman ratio, are identified. They are based upon the ranking where districts of the state are ranked according to their proportions for the decadal years 1961, 1971, 1981, and 1991. The ranks of each district are added. The districtwise figures obtained indicate that higher the value of the composite ranks higher is the concentration of fertility rate, i.e., birth rate and child-woman ratio separately and vice versa.

Birth Rate Region (1961-90)

Fig.43 shows that four levels of birth rate regions are identified. The regions of relatively high to very high grade (151.0 - 203.0 composite rankings) are discontinuously demarcated in the western half of the state. More than half of the districts of the Himalayan zone and some of the

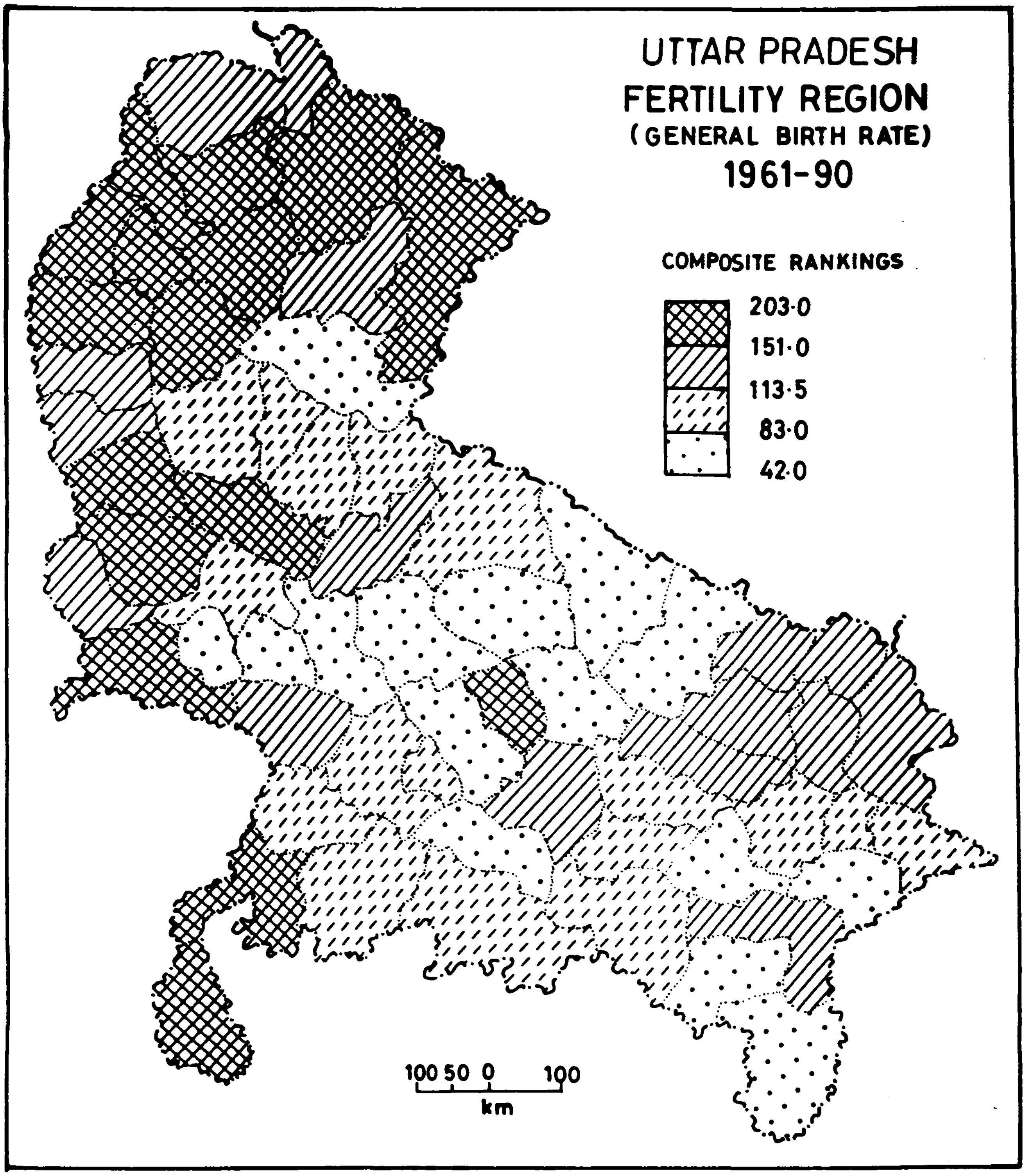

UTTAR PRADESH
FERTILITY REGION
(GENERAL BIRTH RATE)
1961-90
COMPOSITE RANKINGS
203·0
151·0
113·5
83·0
42·0
100 50 0 100
km

FIG.43

northwestern districts of the west plain combinedly constitute a dominant region. A small region of this grade comprises the districts of Bulandshahr, Aligarh and Budaun. Median to high grade (113.5 - 151.0 composite rankings) districts are ununiformely distributed over the state, however, about half of them constitutes a distinct region in the eastern part to include Ballia (134.5), Deoria (126.5), Gorakhpur (115.5), Maharajgani (115.5), Siddharthnagar (120.0), Basti (120.0) and Faizabad (113.5) districts. Between the two regions of median to high and high to very high composite ranking values of birth rates, the regions of below median composite ranking values are demarcated. Median to low grade (113.5 - 83.0 composite rankings) districts form two well marked regions. One lies in the southern half of the state and includes about half of the plateau districts and some of the central and east plain districts. Other is found in western part and comprises five districts of west plain, they against their composite ranking values of the birth rates are Moradabad (99.5), Rampur (103.0), Bareilly (85.0) Pilibhit (90.0) and Kheri (89.5). It may be highlighted that between these regions a big region of low to very low grade (83.0 - 42.0 composite rankings) is found which comprises about two-thirds districts of this grade. It is observed that in this region there has been relatively low birth rate during 1961-90.

Other districts of this ranking interval are Nainital, Jaunpur, Ghazipur, Mirzapur and Sonbhadra.

In rural population composite rankings vary widely from a minimum of 47.0 in Mirzapur and Sonbhadra to a maximum of 206.0 in Garhwal. The regional distribution is fairly well marked and the the regions defined by the quartiles of 206.0 to 133.5, 133.5 to 115.0, 115.0 to 89.5 and 89.5 to 47.0 composite rankings are identified in the state (Fig.44). Among the indices of representation it is only the high group (133.5 to 206.0 composite rankings) which has formed a prominent continuous region in the western half of the state and comprises majority of districts of the Himalayan zone and west plain. Within this region two districts of Dehradun and Nainital emerge as a spot of low to bery low slab. A discontinuous region of median to high grade (115.0 - 133.5 composite rankings) is found in the western part to include some of west plain and the Himalayan districts. Two regions of this similar grade are identified : one in southwestern section to include four districts of Mathura, Agra, Etah and Etawah and the other in the eastern section to comprises the districts of Ballia, Deoria, Maharajganj and Gorakhpur. Fig.44 shows that relatively the districts of below median composite ranking values of birth rate demarcate the dominant region in almost eastern half of the state. Two regions of median to low

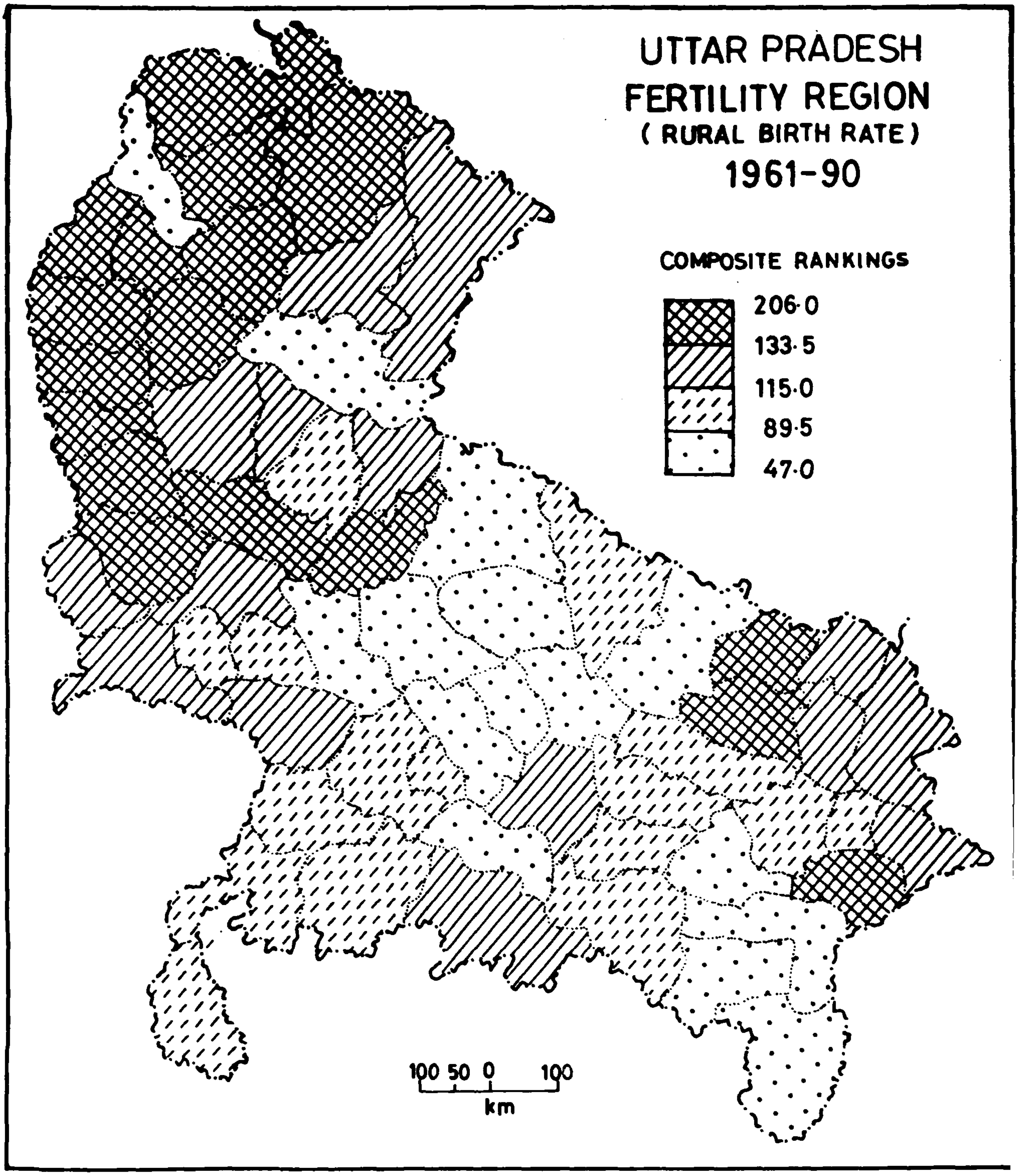

UTTAR PRADESH
FERTILITY REGION
(RURAL BIRTH RATE)
1961-90
COMPOSITE RANKINGS
206·0
133·5
115·0
89·5
47·0
100 50 0 100
km

FIG.44

grade (115.0 - 89.5 composite rankings) of almost equal size are found. One lies in the eastern part and comprises the districts of Allahabad, Pratapgarh, Sultanpur, Faizabad, Azamgarh and Mau, and the other lies in the southwestern part to include the districts of Lalitpur, Jhansi, Hamirpur, Jalaun, Kanpur Dehat and Kanpur Nagar. About two-thirds districts of low to very low grade (89.5 - 47.0 composite rankings) form a big region in the central part of the state. Four districts Jaunpur, Varanasi, Mirzapur and Sonbhadra, of this grade constitute a small region in southeastern part.

In the distribution of the birth rate regions of urban population, uniform pattern is not observed in the state. However, the distinct regions but of small size of different grades are found (Fig.45). Two interrupted narrow belts of high to very high composite ranking slab are demarcated in the western part - one lies in the extreme western part and the other in the extreme east of this region. It includes Aligarh, Bulandshahr, Moradabad, Budaun and Shahjahanpur. About half of the districts of this slab combinedly constitutes a continuous region in the eastern part. These districts are Allahabad, Pratapgarh, Sultanpur, Azamgarh, Mau, Gorakhpur and Maharajganj. The majority of median to low slab districts constitute a distinct region in the northern part of the plains. Three districts (Bijnor,

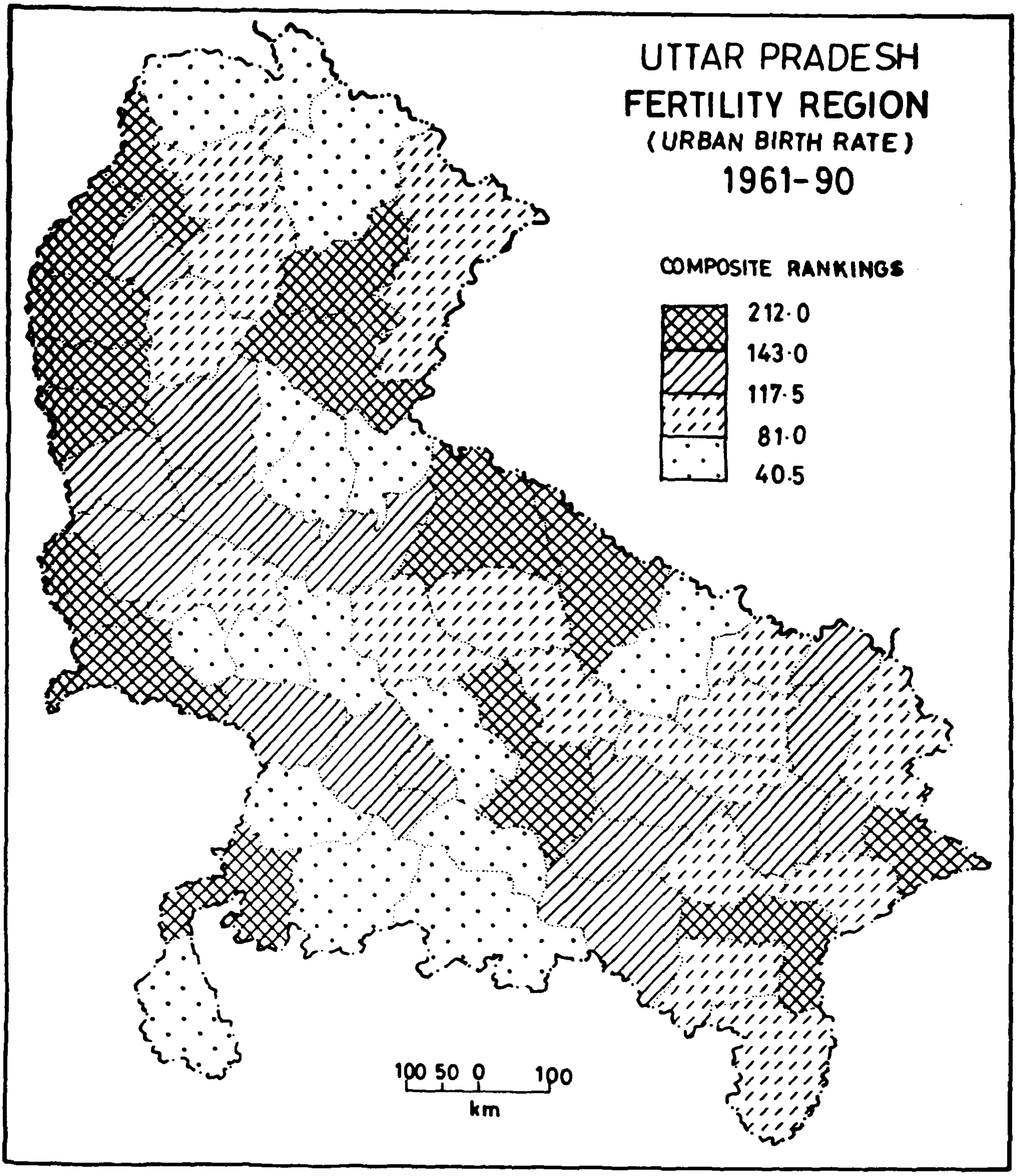

UTTAR PRADESH
FERTILITY REGION
(URBAN BIRTH RATE)
1961-90
COMPOSITE RANKINGS
212·0
143·0
117·5
81·0
40·5
100 50 0 100
km

FIG.45

Tehri Garhwal and Garhwal) of the same grade constitute a small region in the northern part. Other districts of this slab are scattered over the eastern part of the state. A discontinuous region of low to very low grade of composite rankings stretches from southern districts of the plateau zone to some northern districts of west plain as shown in Fig.45.

Child-Woman Ratio Region (1961-91)

Child-woman ratio regions (1961-91) for total population are demarcated in Fig.46. The range of their rankings as compared to birth rate regions is very wide. It varies from 16.0 in Chamoli to 241.5 in Bijnor. It indicates that the ranking obtained by these districts have been found to be uniform throughout the years taken in the present study. The interdistrict variations in total composite rankings may be arranged into quartiles of high to very high (173.0 - 241.0 composite rankings), median to high (126.0 - 173.0 composite rankings), median to low (126.0 - 80.0 composite rankings) and low to very low (80.0 - 16.0 composite rankings). The distribution of these graded composite rankings of child-woman ratio is shown in Fig.46. Figure depicts very remarkable regions of different grades. One compact region of high to very high grade of composite rankings occupies half of the west plain district

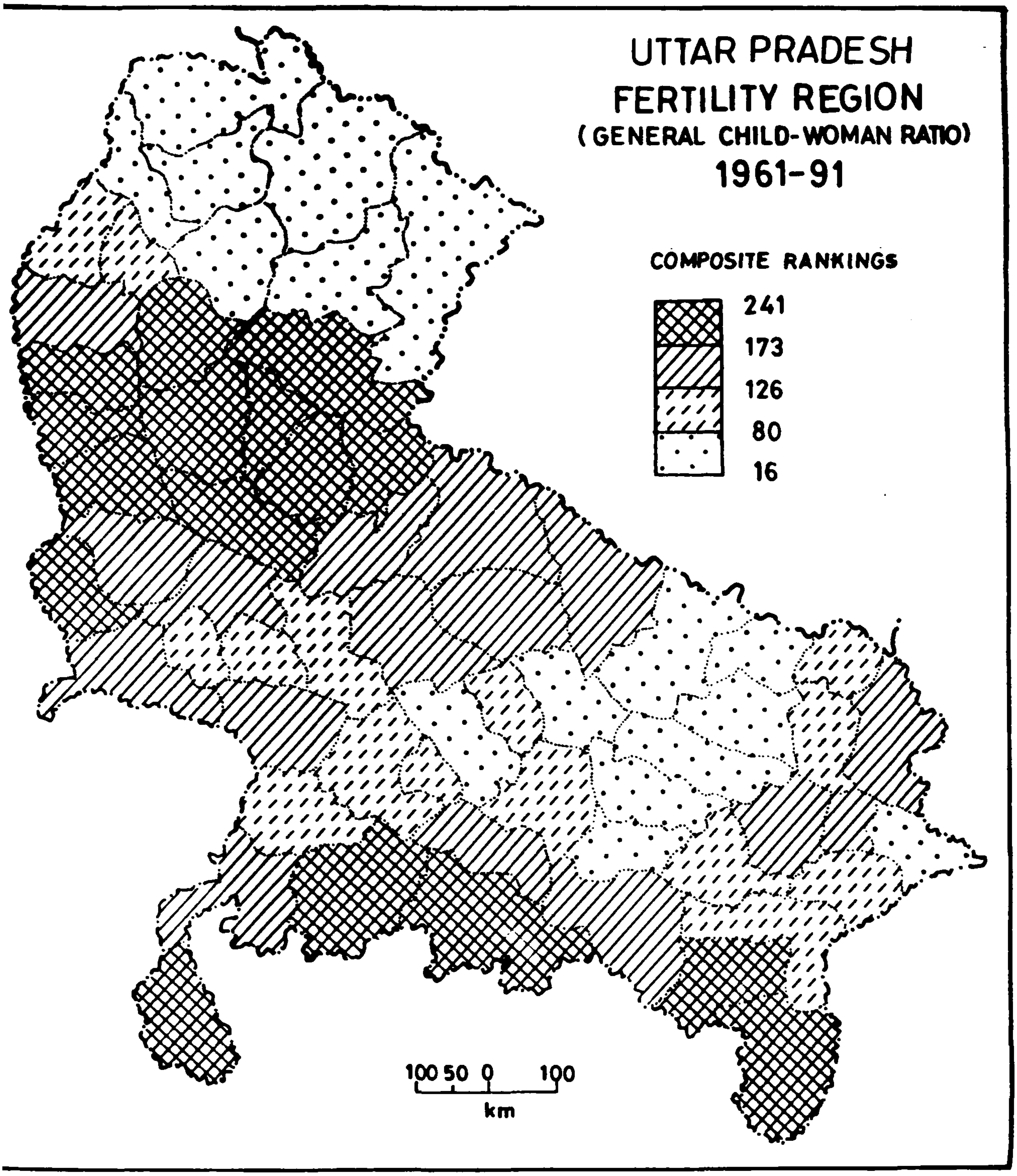

UTTAR PRADESH
FERTILITY REGION
(GENERAL CHILD-WOMAN RATIO)
1961-91
COMPOSITE RANKINGS
241
173
126
80
16
100 50 0 100
km

FIG.46

and Nainital - a Himalayan district. Remaining districts of this slab delimit an interrupted region in the southern part of the state. Immediate south of the former region a big discontinuous region of median to high grade is demarcated which is interrupted by Farrukhabad. This region covers about two-thirds districts of this grade. A small region of this grade is found in the eastern part to include Azamgarh, Mau and Deoria, it is separated from Allahabad and Fatehpur of same grade by Jaunpur - a district of median to low grade. A most prominent region of median to low grade (126.0 - 80.0 composite rankings is formed almost in south-western part and comprises about half of the districts of this slab. It is separated from two small regions found in central and eastern part by Pratapgarh (70.5) district of low to very low grade of composite rankings as shown in fig.46. Two equal and compact regions of low to very low grade (80.0 - 16.0 composite rankings) are identified in the state. One lies in the eastern half of the state and the other in the Himalayan zone. Former includes some eastern and some central plain districts. These districts, in ascending order of the grade, are Faizabad (60.0), Sultanpur (60.0), Barabanki (62.5), Pratapgarh (70.5), Gonda (78.0), Basti (78.5), Siddharthnagar (78.5). The latter region, with the exception of Nainital, occupies all the districts of the Himalayan zone.

With few exceptions, the general pattern of child-woman ratio regions is similar to the rural pattern of child-woman ratio regions. The high to very high grade regions are found in the western and southern parts. The former region occupies about two-thirds districts and stretches from Saharanpur in the north to Agra in the south. The second one is discontinuously observed in the plateau zone. It comprises the districts of Hamirpur (178.0), Banda (197.0), Mirzapur (191.5), Sonbhadra (191.5) and Lalitpur (177.0). The former region is surrounded by the districts of low to very low grade in the north and median to high grade in the south. Fig.47 depicts that there are two regions of median to high grade (127.5 - 177.0 composite rankings). One which is dominant lies in the central part and includes Etah, Firozabad, Mainpuri, Etawah, Jalaun, Kanpur Dehat, Kanpur Nagar, Farrukhabad, Hardoi, Sitapur and Kheri. Other small region is found in northwestern part to include Meerut, Ghaziabad and Muzaffarnagar. The districts of median to low composite ranks of rural child-woman ratios are mainly concentrated in the eastern part of the state and comprises two-thirds districts of this slab. Other districts of these ranks are too scattered to form any identifiable region. Two dominant regions of low to very low composite rankings (79.5 - 12.0) are demarcated in the state : one is found in the central part and includes the

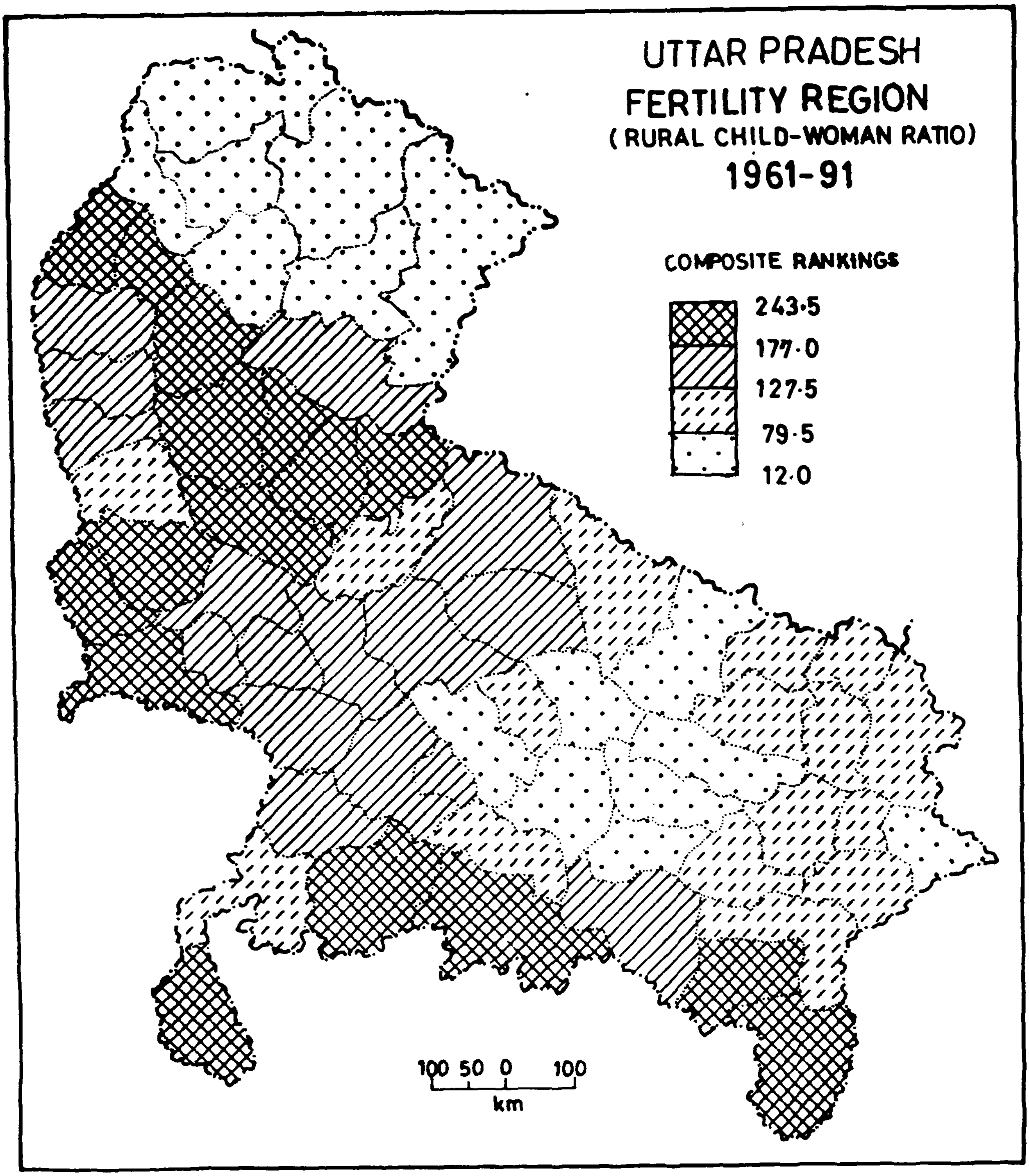

UTTAR PRADESH
FERTILITY REGION
(RURAL CHILD-WOMAN RATIO)
1961-91
COMPOSITE RANKINGS
243·5
177·0
127·5
79·5
12·0
100 50 0 100
km

FIG. 47

districts of Unnao, Rae Bareli, Pratapgarh, Sultanpur, Barabanki, Faizabad and Gonda, and the second lying in the extreme north occupies seven Himalayan districts out of eight. It may be observed from the Fig. 47 that in the plains there is sharp decline in composite ranks of rural child-woman ratio during 1961-91 from west to east but moderate decline from east to west and maintains a shallow belt (low to very low grade) in the central part of the state.

The composite ranks of child-woman ratio of urban population for the four decadal years varies widely from 12.0 to 236.5 with a minimum composite rank of 12.0 in Almora and a maximum of 236.5 in Saharanpur. The district-wise distribution of composite ranking values of child-woman ratio may be arranged into four grades of very low to low (12.0 - 87.0 composite rankings), low to median (87.0 - 137.0 composite rankings), median to high (137.0 - 164.0 composite rankings) and high to very high (164.0 - 236.5 composite rankings) based on quartile technique. Fig.48 depicts that an interrupted region of high to very high grade of composite rankings is found in the western margin of the state. Agra and Aligarh belonging to low to median slab and Jalaun of median to high slab, have caused this discontinuity. Five districts of Azamgarh (186.0), Mau (186.0), Jaunpur (199.0), Mirzapur (168.0) and Sonebhadra (168.0), combinedly constitute a discontinuous region interrupted by Varanasi in eastern part of the state.

Majority of southern districts constitute a distinct region of median to high grade. Besides, two small regions of this slab are identified : one lies in the western plain to include Budaun (151.5), Bareilly (159.0) and Pilibhit (142.5) districts and other lies in east plain to comprise Gonda (142.0), Basti (149.0) and Siddharthnagar (149.0) districts. A narrow oblique belt of median to low grade is depicted as division of Uttar Pradesh plains into east and west sections. It stretches from Agra in extreme west to Bahraich in the northeast and Rae Bareli in the south. A small region of this interval comprised of Garhwal (121.5), Nainital (108.5) and Pithoragarh (87.0) districts is identified in the Himalayan zone. Three regions of low to very low grade of composite ranks are found. One lies in the central part and includes four districts of Kanpur Dehat, Kanpur Nagar, Unnao and Lucknow, second is found in the Himalayan zone to include Uttar Kashi, Tehri Garhwal and Dehradun and third is located in the eastern part (Fig.48).

It may be observed that composite ranks of child-woman ratio of urban population tend to decrease from west to centre and north, from south to north and east to west which depicts a distinct belt of below median grade in central part of the state and the Himalayan zone. It depicts that the consistency in relatively low child-woman ratio is maintained during four decadal years since 1961.

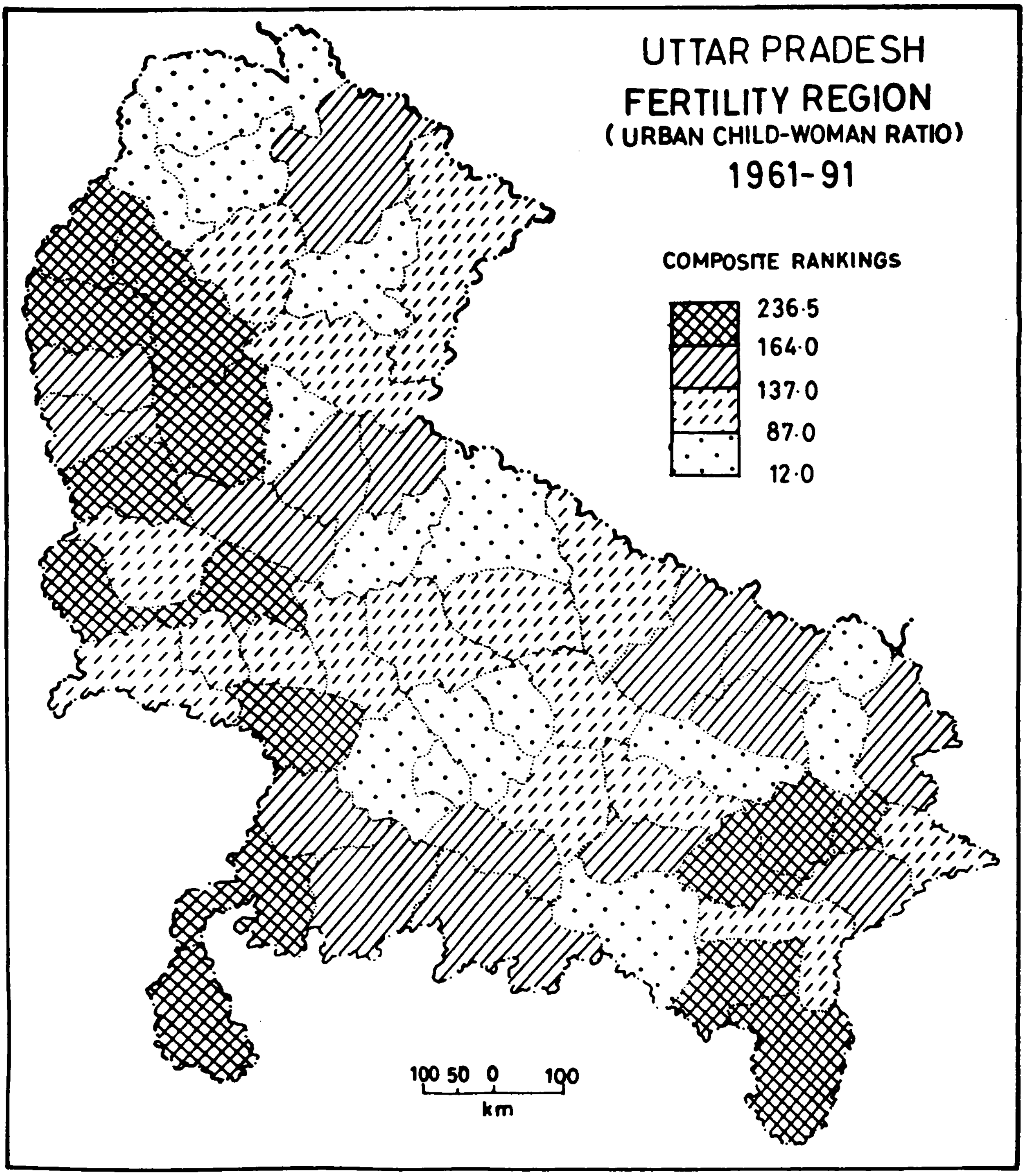

UTTAR PRADESH
FERTILITY REGION
(URBAN CHILD-WOMAN RATIO)
1961-91
COMPOSITE RANKINGS
236·5
164·0
137·0
87·0
12·0
100 50 0 100
km

FIG. 48

FERTILITY AND INDEPENDENT VARIABLES

In the present investigation, relationship have been sought between fertility (birth rate and child-woman ratio) and variables for total, rural and urban areas of the districts. Selection of each variable is based on an ability to develop a rational hypothesis of relationship between the variables and fertility. The study design required the definition of variables suitable for parametric methods of statistical analysis and made it necessary to give a quantitative value to each variable for each district of the state. A complete list of variables that affect or may probably affect fertility of total, rural and urban population of the districts is given in Table 02.

Test of Simple Linear Correlation

The hypothesis proposed is to test the probable demographic and non-demographic variables which significantly and non-significantly influence human fertility in the state. In this regard the simple association between fertility (birth rate and child-woman ratio) and each of the independent variable is computed and tested at 95 per cent level of confidence. These determinants of fertility are tested with the assumption that linear relationship existed in all the cases.

Relationship between Birth Rate and Independent Variables

The null hypothesis formulated is that the ~~high~~ birth rate (Y_{01}) is not significantly related with the selected variables. The t-test gives the value which goes well above the adopted level of significance for Y_{01}. The variables X_{03} (percentage of urbanization), X_{06} (percentage of Christians population), X_{19} (number of family welfare clinics per lakh population), X_{20} (per capita government expenditure in Rs. on health services), X_{33} (percentage of female married population in age group 20-24), X_{39} (child-woman ratio), X_{40} (death rate) and X_{41} (infant death rate) are significantly correlated with birth rate (Y_{01}) at 5 per cent level. X_{19} and X_{40} obtain high positive correlation and X_{39} the high negative correlation with birth rate (Y_{01}) and they are significant even at 1 per cent level. X_{03}, X_{06} and X_{20} have positive and X_{33} and X_{41} have negative correlation with birth rate (Y_{01}). These variables are well above the adopted level of significance and therefore the null Hypothesis is rejected. This means that there is acceptable validity in the assumption that the districts with high percentage of urbanization, percentage of Christians population, per capita government expenditure in Rs. on health services, death rate and relatively large number of family welfare clinics per lakh population have high birth rate whereas the districts with high child-woman ratio, percentage of female married population in age group 20-24 and infant death rate have low birth rate (Table 09).

The variables selected for the analysis of birth rate in the rural population get reduced by the linear correlation analysis, total dependency ratio (X_{22}) and senile dependency ratio (X_{24}) have positive degree of relationship with rural birth rate (Y_{01}) which are significant at 1 per cent level. Besides the variables, X_{07} (percentage of Scheduled Castes and Scheduled Tribes population), X_{15} (number of hospital beds per lakh population), X_{16} (number of doctors per lakh population), X_{40} (death rate) and X_{41} (infant death rate) are significant at 95 per cent level of confidence. First four have positive and last one has the negative correlation with rural birth rate (Y_{01}). About eighty-three per cent of the rural variables lie in the scale of very low degree of relationship and they are observed to be not the determining factors in the rural birth rate differentials(Table 09).

It may be concluded that the regional variation in fertility (birth rate) of the rural population is mainly caused by demographic and cultural situations and medical facilities.

For the analysis of urban birth rate, forty variables are used and assumed hypothesis of some direct

TABLE 09

RESULTS OF SIMPLE LINEAR CORRELATIONS (r) OF VARIABLES WITH FERTILITY (BIRTH RATE) IN TOTAL , RURAL AND URBAN POPULATION, UTTAR PRADESH

NO(!!

Variable (See Table 02)	BIRTH RATE (Y_{01}) Total	Rural	Urban
NAMES ! X_{01}	+0.130	+0.066	+0.273**
X_{02}	-0.016	-0.053	+0.037
X_{03}	+0.275**	-0.039	+0.019
X_{04}	-0.061	-0.197	+0.116
X_{05}	+0.052	+0.018	-0.101
X_{06}	+0.272**	+0.018	+0.141
X_{07}	-0.040	-0.278**	-0.024
X_{08}	+0.027	-0.047	+0.128
X_{09}	+0.065	-0.090	-0.054
X_{10}	-0.049	-0.058	-0.156
X_{11}	-0.032	+0.055	-0.185
X_{12}	-0.033	+0.121	+0.053
X_{13}	-0.099	-0.126	-0.015
X_{14}	-0.014	-0.176	-0.012
X_{15}	+0.067	-0.277**	-0.041
X_{16}	+0.079	-0.278**	+0.029
X_{17}	+0.065	+0.083	-0.038
X_{18}	-0.070	-0.100	-0.082

TABLE 09 (Contd.)

X_{19}	+0.329*	+0.052	+0.054
X_{20}	+0.277**	-0.41	+0.271**
X_{21}	+0.079	+0.013	-0.089
X_{22}	-0.094	+0.420*	+0.371*
X_{23}	-0.076	+0.139	+0.622*
X_{24}	-0.106	+0.331*	-0.397*
X_{25}	+0.066	-0.004	-0.676*
X_{26}	+0.113	-0.100	+0.726*
X_{27}	+0.154	-0.050	+0.315**
X_{28}	-0.171	+0.028	+0.015
X_{29}	-0.040	-0.103	+0.549*
X_{30}	+0.179	+0.037	-0.051
X_{31}	+0.187	-0.009	+0.274**
X_{32}	-0.046	-0.004	-0.265**
X_{33}	-0.261**	+0.008	0.512*
X_{34}	-0.177	+0.049	+0.392*
X_{35}	-0.008	-0.057	-0.356*
X_{36}	+0.021	+0.006	+0.320**
X_{37}	-0.006	-0.008	-0.295**
X_{38}	Dependent Variable (Birth Rate)		
X_{39}	-0.534*	-0.012	-0.686*
X_{40}	+0.717*	+0.312**	+0.736*
X_{41}	-0.312**	-0.265**	-0.176

* Significant at 1 per cent level

** Significant at 5 per cent level

relationship has been tested. The computed values differ from each other and vary within a substantially wide range. Forty-five per cent of the determinants are significant at 95 per cent level of confidence in their relationship with urban birth rate (Y_{01}). Even twenty-seven per cent of the variables are significant at 99 per cent level of confidence. These are juvenile dependency ratio (X_{23}), literacy rate (X_{26}), percentage of female education upto middle school (X_{29}) and death rate (X_{40}) have high positive and the sex ratio (X_{25}), percentage of female married population in age group 20-24 (X_{33}) and child-woman ratio (X_{39}) the high negative degree of relationship; whereas total dependency ratio (X_{22}) and percentage of population in agricultural activity (X_{34}) have relatively low degree of positive correlation. Senile dependency ratio (X_{24}) and percentage of population in non-agricultural activity (X_{35}) have relatively low degree of negative relationships with urban birth rate (Y_{01}). Besides, the variables X_{01} (density of population), X_{20} (per capita government expenditure in Rs. on health services), X_{27} (female literacy rate), X_{31} (percentage of female graduates and others), X_{32} (percentage of female married population in age group 15-19), X_{36} (percentage of female population in agricultural activity) and X_{37} (percentage of female population in non-agricultural activity) have significant correlation coefficients with urban birth rate (Y_{01}). X_{01}, X_{20}, X_{27}, X_{31} and X_{36} have positive, X_{32} and X_{37} the negative correlation with urban birth rate (Y_{01}). All these determinants of high and low degree of relationship prove the hypothesis to be valid and acceptable at as high a level as 95 per cent of the probability.

Relationship between Child-Woman Ratio
and Independent Variables

The simple association of child-woman ratio with forty independent variables are obtained and the results are shown in Table 10. The variables which have the high degree of relationship and significant at 1 per cent level are :

X_{33} (percentage of female married population in age group 20-24)

X_{34} (percentage of population in agricultural activity)

X_{20} (per capita government expenditure in Rs. on health services)

X_{26} (literacy rate)

X_{27} (female literacy rate)

X_{37} (percentage of female population in non-agricultural activity)

X_{38} (birth rate) and

X_{40} (death rate).

TABLE 10

RESULTS OF SIMPLE LINEAR CORRELATIONS (r) OF VARIABLES WITH FERTILITY (CHILD-WOMAN RATIO) IN TOTAL, RURAL AND URBAN POPULATION, UTTAR PRADESH

Variable (See Table 02)	Child-Woman Ratio (Y_{02})		
	Total	Rural	Urban
X_{01}	-0.121	+0.104	+0.028
X_{02}	-0.171	-0.282**	-0.289**
X_{03}	-0.314**	+0.267**	-0.011
X_{04}	-0.068	-0.461*	-0.307**
X_{05}	+0.060	+0.427*	+0.328*
X_{06}	-0.185	+0.140	-0.266**
X_{07}	-0.075	-0.124	+0.011
X_{08}	-0.012	-0.143	-0.171
X_{09}	-0.278**	+0.013	-0.189
X_{10}	-0.063	+0.113	+0.110
X_{11}	+0.173	+0.257**	+0.087
X_{12}	+0.075	+0.257**	+0.091
X_{13}	+0.030	+0.092	+0.127
X_{14}	-0.268**	-0.342*	-0.270**
X_{15}	-0.288**	-0.311**	-0.101
X_{16}	-0.307**	-0.293**	-0.292**
X_{17}	+0.030	-0.264**	-0.102
X_{18}	+0.011	-0.344*	-0.179
X_{19}	-0.251**	-0.066	-0.065

TABLE 10 (Contd.)

X_{20}	-0.467*	+0.079	-0.336*
X_{21}	-0.048	+0.328*	+0.059
X_{22}	-0.011	+0.257**	-0.470*
X_{23}	-0.008	+0.296**	-0.558*
X_{24}	-0.012	-0.030	+0.707*
X_{25}	-0.108	-0.399*	+0.847*
X_{26}	-0.410*	-0.388*	-0.825*
X_{27}	-0.445*	-0.314**	-0.483*
X_{28}	+0.270**	+0.076	+0.036
X_{29}	+0.179	-0.130	-0.639*
X_{30}	-0.268**	-0.021	-0.035
X_{31}	-0.320**	-0.052	-0.267**
X_{32}	+0.256**	+0.006	+0.463*
X_{33}	+0.458*	+0.154	+0.736*
X_{34}	+0.349*	-0.065	-0.385*
X_{35}	-0.165	-0.111	+0.336*
X_{36}	-0.015	-0.386*	-0.376*
X_{37}	-0.001	+0.386*	+0.341*
X_{38}	-0.534*	-0.012	-0.686*
X_{39}	Dependent Variable (Child-Woman Ratio)		
X_{40}	-0.737*	-0.292**	-0.810*
X_{41}	+0.006	+0.036	+0.019

* Significant at 1 per cent level.

** Significant at 5 per cent level.

The first two have direct relationship with child-woman ratio (Y_{02}), whereas the remaining six bear an inverse relationship. Ten variables are significant at confidence limit of 95 per cent though the actual magnitudes of their coefficients are different. Percentage of female education upto primary school (X_{28}) and percentage of female married population in age group 15-19 (X_{32}) are found to have direct relationship with child-woman ratio (Y_{02}) but percentage of urbanization (X_{03}), number of medical hospitals, dispensaries per lakh population (X_{14}), female age at marriage (X_{09}), number of hospital beds per lakh population (X_{15}), number of doctors per lakh population (X_{16}), number of family welfare clinics per lakh population (X_{19}), percentage of female education upto high school and intermediate (X_{30}) and percentage of female graduates and others (X_{31}) are found to bear an inverse relationship with total child-woman ratio (Y_{02}). Table 10 shows that about fifty-seven per cent vatiables having the negative and positive correlation with child-woman ratio (Y_{02}) are well below the confidence level of significance.

Medical facilities, educational level and marital status are the chief variables which have substantial impact on the pattern of fertility (child-woman ratio).

The results of simple correlation for rural child-woman ratio (Y_{02}) are compared with those of total population. We find that almost all the variables are dissimilar in direction of relationship, but seven variables X_{03}, X_{14}, X_{15}, X_{16}, X_{26}, X_{27} and X_{40} are similar to total child-woman ratio. Percentage of Muslims population (X_{05}), percentage of population growth (X_{21}), percentage of female population in non-agricultural activity (X_{37}), percentage of Hindus population (X_{04}), number of medical hospitals, dispensaries per lakh population (X_{14}), number of mother and infant welfare centres per lakh population (X_{18}), sex ratio (X_{25}), literacy rate (X_{26}) and percentage of female population in agricultural activity (X_{36}) are significantly associated with child-woman ratio (Y_{02}) at 1 per cent significant level. First three variables have significant positive correlation and the last six have negative correlation with rural child-woman ratio (Y_{02}). Eleven variables X_{02}, X_{03}, X_{11}, X_{12}, X_{15}, X_{16}, X_{17}, X_{22}, X_{23}, X_{27} and X_{40} are found to be significant at 5 per cent level (Table 10). X_{02}, X_{15}, X_{16}, X_{17}, X_{27} and X_{40} have significantly negatively correlated with rural child-woman ratio (Y_{02}) and X_{03}, X_{11}, X_{12}, X_{22} and X_{23} have significantly positively correlated with rural child-woman ratio (Y_{02}). About fifty per cent and determinants are found to be far below the significance level.

It may be pointed out that educational attainments, medical facilities, socio-economic status influence the regional variations in fertility (child-woman ratio) behaviour of the rural population.

The computed values of association of urban child-woman ratio with the variables differ from each other and vary within a wide range. Seventeen variables are significant at 99 per cent level of confidence in their relationship with the child-woman ratio (Y_{02}). They are:

X_{24} (senile dependency ratio)

X_{25} (sex ratio)

X_{33} (percentage of female married population in age gro 0-24)

X_{05} (percent-ge of Muslims population)

X_{32} (percentage of female married population in age group 15-19)

X_{35} (percentage of population in non-agricultural activity)

X_{37} (percentage of female population in non-agricultural activity)

X_{23} (juvenile dependency ratio)

X_{26} (literacy rate)

X_{29} (percentage of female education upto middle school)

X_{38} (birth rate)

X_{40} (death rate)

X_{20} (per capita government expenditure in Rs. on health services)

X_{22} (total dependency ratio)

X_{27} (female literacy rate)

X_{34} (percentage of population in agricultural activity) and

X_{36} (percentage of female population in agricultural activity)

First seven have positive relationship with child-woman ratio (Y_{02}). Rest of the variables are found to be negatively correlated with child-woman ratio, whereas X_{23}, X_{26}, X_{29}, X_{38} and X_{40} are significantly negatively correlated. Total dependency ratio (X_{22}), juvenile dependency ratio (X_{23}), literacy rate (X_{26}), female literacy rate (X_{27}) and vital process-birth rate and death rate (X_{38} and X_{40}) are strongly but negatively correlated with child-woman ratio (Y_{02}) of urban population. Besides six variables have significantly negative correlation with urban child-woman ratio (Y_{02}) at 95 per cent level of confidence. They are:

Migration rate (X_{02})

percentage of Hindus population (X_{04})

percentage of Christians population (X_{06})

number of medical hospitals, dispensaries per lakh population (X_{14})

number of doctors per lakh population (X_{16}) and

percentage of female graduates and others(X_{31}).

All these determinants of relationships prove the hypothesis to be valid and acceptable at 95 per cent of the probability. Of these only senile dependency ratio, sex ratio, percentage of female married population in age group 20-24), percentage of Muslims population, percentage of female married population in age group 15-19, percentage of population in non-agricultural activity and percentage of female population in non-agricultural activity are found to have the positive correlation coefficients. It is observed that higher the juvenile dependency ratio, literacy rate, percentage of female education upto middle school, birth rate, death rate, per capita government expenditure in Rs.on health services, total dependency ratio, female literacy rate, percentage of population in agricultural activity, percentage of female population in agricultural activity, migration rate, percentage of Hindus population, percentage of Christians population, number of medical hospitals, dispensaries per lakh population, number of doctors per lakh population and percentage of female graduates and others, the lesser is the urban child-woman ratio.

The simple linear correlation analysis leads to the broad conclusion that medical facilities, educational attainments, socio-economic status and dependency ratio are main variates which influence the patterns of fertility differential of the urban population.

It may be pointed out that the independent variables selected for the anaysis of fertility and mortality differentials in the state are the same. Therefore, the factor analysis has been discussed, in detail, in Chapter VI of mortality.

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CHAPTER VI

MORTALITY

The study of mortality is useful for analysing current demographic conditions as well as for determining the prospects of potential changes in mortality conditions of the future. The public health administration depends heavily on the study of mortality, for statistics on death in the population cross-classified by age, sex and the cause of death are of great value for the formulation, implementation and evaluation of public health programmes. Statistics on deaths also form the basis of the policies of insurance companies.

In present chapter, a four-pronged thrust is attempted for the regional analysis of mortality. The first prong of the thrust is to highlight the general and residential trends of mortality in the state. The second prong of the thrust is to analyse the distributional patterns of mortality by two main measures of death rate and infant death rate. The third is the identification of the mortality regions in the state. The region is based on districtwise composite rankings of mortality for four decadal years (1961-90). The high ranking shows high mortality and low ranking shows low mortality. Finally, the relationships of the mortality with some selected demographic and non-demographic variables have been obtained through the application of adequate statistical techniques in order to test the hypothesis.

TRENDS OF MORTALITY

Death Rate (1961-90)

Death rate, i.e., the number of deaths per mille mid-year population in the state has undergone the main distinct phase of change. It is shown from Table 11 and Fig.49 that there has been a continuous decline in the death rate from 1961 to 1990 in the state and country as a whole. The death rate in India is nearly two times high as compared to Uttar Pradesh. In Uttar Pradesh it is 8.80 per mille in 1961, 3.97 per mille in 1971, 2.63 per mille in 1981 and 2.18 per mille in 1990, whereas in India the death rate is comparatively high as 13.20 per mille in 1961,7.40 per mille in 1971, 5.70 per mille in 1981 and 3.90 per mille in 1990 (Table 11). During 1961, the death rate was very high in the state as well as country as a whole. The main factors responsible for the heavy death rate in 1961 was the scarcity of food due to droughts and floods in large tracts of the country.[01] It is also evident from Table 11 that Uttar Pradesh had made an impressive progress in fighting against death rates from 1961-90. During the span of forty

TABLE 11

TRENDS OF MORTALITY (DEATH RATE) IN UTTAR PRADESH AND INDIA,1961-90

(per mille)

Year	Uttar Pradesh			India		
	Total	Rural	Urban	Total	Rural	Urban
1961	8.80	8.60	8.61	13.20	9.11	16.24
1971	3.97	3.74	4.34	7.40	7.40	7.60
1981	2.63	2.48	3.04	5.70	5.60	6.00
1990	2.18	1.71	3.94	3.90	3.47	5.53

Source - Vital Statistics of India, 1961, 1971, 1981 and 1990. The unpublished data of 1990 is obtained from the Directorate of Medical and Health Services, Swasthya Bhavan, Lucknow.

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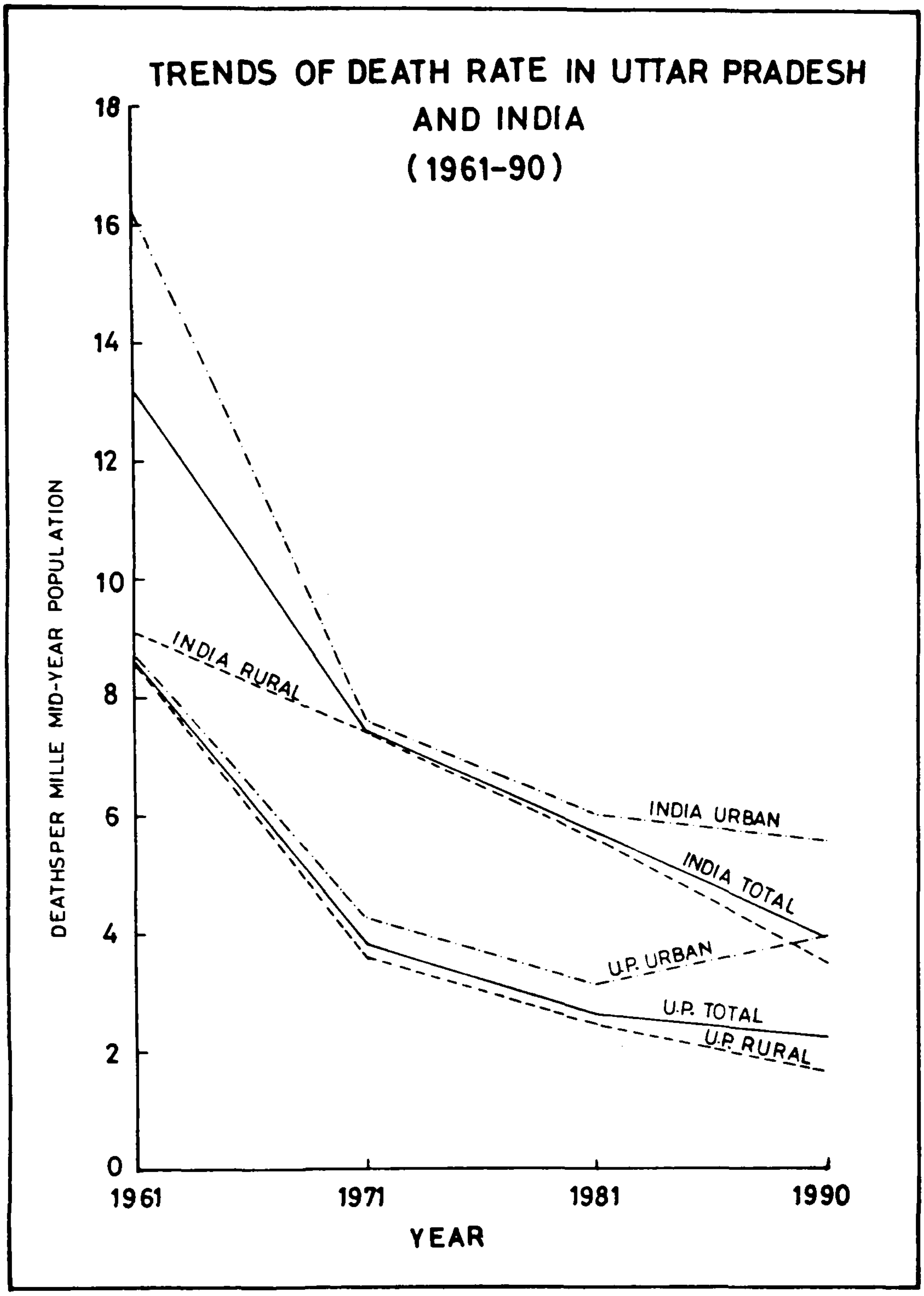

TRENDS OF DEATH RATE IN UTTAR PRADESH AND INDIA (1961-90)
DEATHSPER MILLE MID-YEAR POPULATION
YEAR
0
2
4
6
8
10
12
14
16
18
1961
1971
1981
1990
INDIA RURAL
INDIA URBAN
INDIA TOTAL
U.P. URBAN
U.P. TOTAL
U.P. RURAL

FIG. 49

years the average death rate declined by about twenty-five per cent. The decline in the death rate since then has been due to better distribution of food grains in times of scarcity and the progress made in medicine and public health in combating disease and scourges like the plague, cholera and small pox.[02]

The death rate in Uttar Pradesh still remains very high as compared to other states except Madhya Pradesh (5.90), Kerala (4.90), Orissa (6.30), Goa (6.60), Maharashtra (5.30), Mizoram (4.00), Punjab (6.40), Tamil Nadu (6.20) and Bihar (2.90). One of the general causes of the recent stagnation of the trends of death rate is poor living conditions of the majority of the population. Poverty compounded by the lack of knowledge of proper hygiene and health care accounts for the low status of health of the population.[03] It may be pointed out that a majority of the population is engaged in low productive work such as agriculture. Unpaid family workers share a high percentage of the economically active population, because of the nature of their work earnings are low. In general, the nutritional level of the people is poor, housing is inadequate, it has a low priority in development programmes, medical facilities such as hospital beds, physicians etc. are insufficient and majority of the population is illiterate. This is particularly true of the female population which is responsible for the nutrition of the family and bearing, nursing and rearing of children.[04]

Rural death rate of Uttar Pradesh is lower than that of India for both rural as well as urban population. The main cause for the lower death rate in rural areas may be attributed to the younger age structure. Because of low literacy rate and low standard of living in rural areas, the people do not get their deaths registered which ultimately leads to low death rate. During 1961-1990, infact, the period of forty-years had single distinct phase. Table 11 shows that considerable decline in rural death rate of Uttar Pradesh was observed from 1961 to 1990 whereas in urban population, the death rate declined till 1981 and further increased sharply to 0.90 per mille point in 1990. Death rates decreased to 8.60 per mille in 1961, 3.74 per mille in 1971, 2.48 per mille in 1981 and 1.71 in 1990 for the rural population while in urban population of the state the death rate decreased to 8.61 per mille in 1961, 4.34 per mille in 1971, 3.04 per mille in 1981 and increased to 3.94 per mille in 1990. The death rate in India had declined continuously in both rural as well as urban population during 1961 to 1990. The death rate in rural population was 9.11 per mille in 1961, and decreased to 7.40 per mille in 1971, 5.60 per mille in 1981 and 3.47 per mille in 1990, whereas in urban population it was 16.24 per mille in 1961, and decreased to 7.60 per mille in 1971, 6.00 per mille in 1981 and 5.53 per mille in 1990.

It may be observed that rural-urban variations in the state may be attributed to good health and medical facilities in urban areas than rural areas. As already stated, the villages size is very low in the state. Therefore, it is not easy to provide medical facilities all over the state.[05]

Infant Death Rate (1961-90)

The trends of infant death rate for four selected years are presented in Table 12 and Fig.50. It may be observed that infant death rates tremendously decreased from 1961 to 1990. The infant death rate in Uttar Pradesh was 88.30 per mille in 1961, 43.78 per mille in 1971, 17.86 per mille in 1980 and 14.81 per mille in 1990, whereas in India the infant death rate also declined but it was comparatively high as it was, 79.65 per mille in 1961, 57.00 per mille in 1971, 37.00 per mille in 1981 and 21.00 per mille in 1990. The infant death rate during 1961-1990 decreased to 73.49 per mille points in Uttar Pradesh and 58.65 per mille points in India. As obvious, the decrease infant death rate was higher for Uttar Pradesh than for the country as a whole.

TABLE 12

TRENDS OF MORTALITY (INFANT DEATH RATE) IN UTTAR PRADESH AND INDIA, 1961-90

(per mille)

Year	Uttar Pradesh			India		
	Total	Rural	Urban	Total	Rural	Urban
1961	88.30	88.93	90.83	79.65	75.65	64.50
1971	43.78	42.22	44.00	57.00	59.00	52.00
1980	17.86	16.64	29.63	37.00	38.00	37.00
1990	14.81	15.64	34.34	21.00	17.00	22.00

Source - Vital Statistics of India, 1961, 1971, 1981 and 1990. The unpublished data of 1990 is obtained from the Directorate of Medical and Health Services, Swasthya Bhavan, Lucknow.

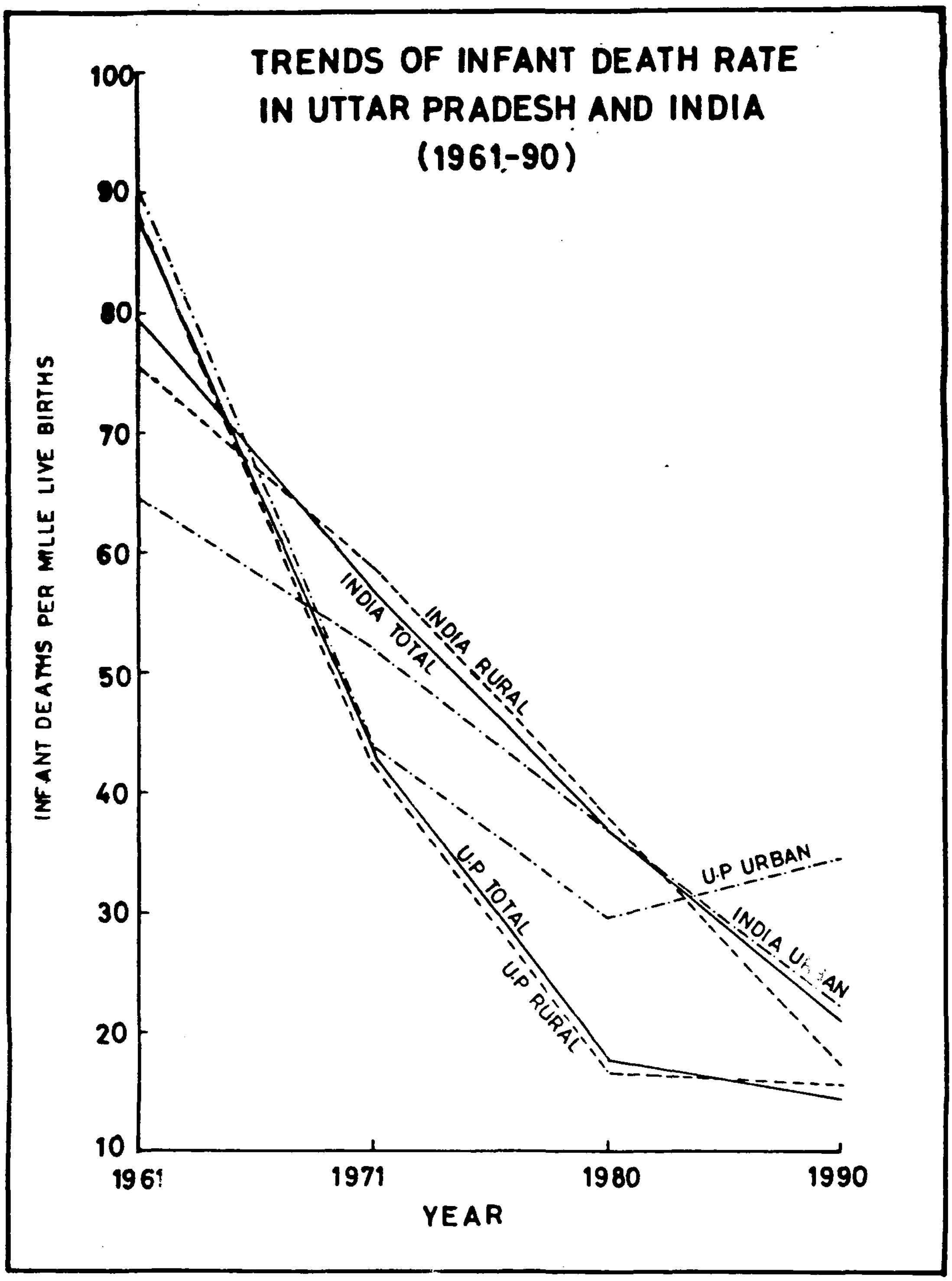

TRENDS OF INFANT DEATH RATE
IN UTTAR PRADESH AND INDIA
(1961-90)
INFANT DEATHS PER MILLE LIVE BIRTHS
100
90
80
70
60
50
40
30
20
10
1961
1971
1980
1990
YEAR
INDIA TOTAL
INDIA RURAL
U.P URBAN
INDIA URBAN
U.P TOTAL
U.P RURAL

FIG.50

It may be observed that infant death rate was already falling, being influenced by improving socio-economic conditions and better health services. The addition of immunization cn an intensive scale would accelerate this fall.[06]

Infant death rates by residence continuously declined but in urban population it declined only till 1980 and further increased to 5.71 per mille in 1990. Infant death rates in rural population decreased to 88.93 per mille in 1961, 42.22 per mille in 1971, 16.64 per mille in 1980 and 15.64 per mille in 1990 while in urban population it declined to 90.83 per mille in 1961, 44.00 per mille in 1971 and 29.63 per mille in 1980, and increased to 34.34 per mille in 1990. Infant death rates of rural and urban population of the country had also continuously declined during 1961-90 Fig.50. In rural population it was 75.65 per m ille in 1961, 59.00 per mille in 1971, 38.00 per mille in 1980 and 17.00 per mille in 1990, whereas in urban population it was 64.50 per mille in 1961, 52.00 per mille in 1971, 37.00 per mille in 1980 and 22.00 per mille in 1990 (Table 12).

This decline may be attributed to increased medical facilities. The difference in the stages of decline in infant death rates shows that there was greater scope in Uttar Pradesh for a faster decline in infant death rate as evidenced by a wide difference rural-urban population. The agricultural set up of Uttar Pradesh may be responsible for its higher infant death rate. Another study also suggests that females whose husband were farmers, had the higher infant death rates as compared to others. The lowest female literacy rate in Uttar Pradesh may also be responsible for its high infant death rate.[07]

REGIONAL PATTERNS OF MORTALITY

Death Rate 1961

General Distribution

The death rates, i.e., number of deaths per mille mid-year population vary between the minimum of 2.20 in Sitapur to the maximum of 30.50 in Moradabad in 1961. The district of maximum value is followed by Budaun which records the death rate about half of the Moradabad, i.e., 14.70 (Table 13). The districtwise distribution of death rates may be arranged into quartiles of very low to low (2.20 to 6.40), low to median (6.40 to 8.20), median to high (8.20 to 11.10) and high to very high (11.10 to 30.50) grades as shown in Fig.51. The districts of high to very high grade of death rates (11.10 - 30.50) constitute a big region in western half of the state. The small patches of median to high death rates are found in this region and some

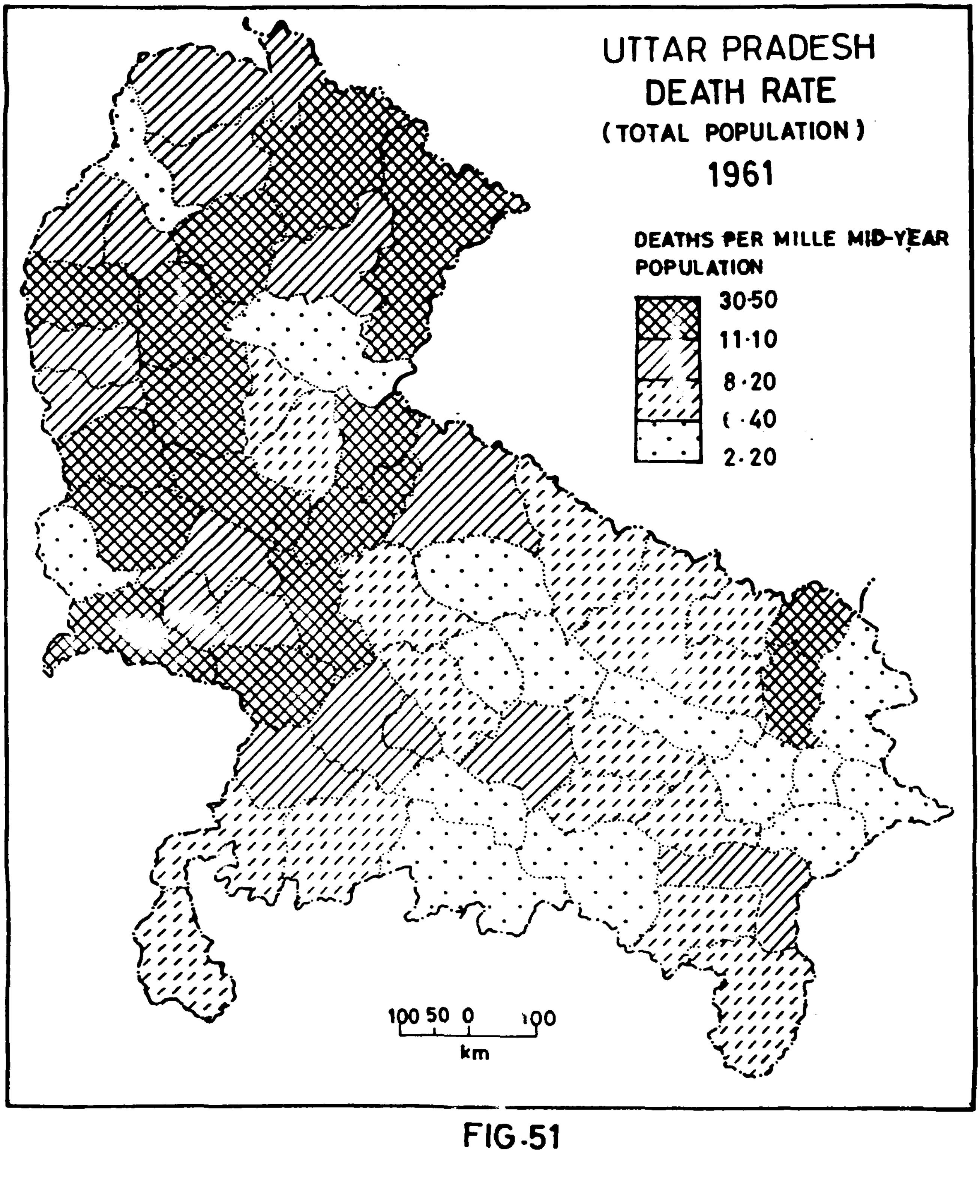

UTTAR PRADESH
DEATH RATE
(TOTAL POPULATION)
1961
DEATHS PER MILLE MID-YEAR POPULATION
30·50
11·10
8·20
·40
2·20
100 50 0 100
km

FIG-51

immediately in the east of the region. The eastern half of the state is dominated by the districts having death rates below median. The discontinuous region of median to low death rates (8.20 - 6.40) found in the eastern half of the state is separated by a narrow belt of low to very low death rates. This belt of below 6.40 death rates is comprised of nine districts of Sitapur, Lucknow, Barabanki, Faizabad, Azamgarh, Mau, Ghazipur, Ballia and Deoria in the northern section and three districts - Fatehpur (6.20), Banda (3.70) and Allahabad (5.60) in the southern section of the eastern half of the state. It may be highlighted that eastern districts appear to have a lower death rate which may be a fact or may be due to greater extent of under-registration in those areas.[08]

Rural/Urban Distribution

The death rate of the rural population in Uttar Pradesh is considerably similar to that of the total and the urban population in 1961. Though the pattern of regional distribution of death rates are dissimilar. Fig.52 shows that a prominent region of high to very high grade of (11.10 - 32.10) death rates is found in the western half of the state. The districts of median to high death rates are so scattered in the state that they do not form any identifiable region. The districts of below median death

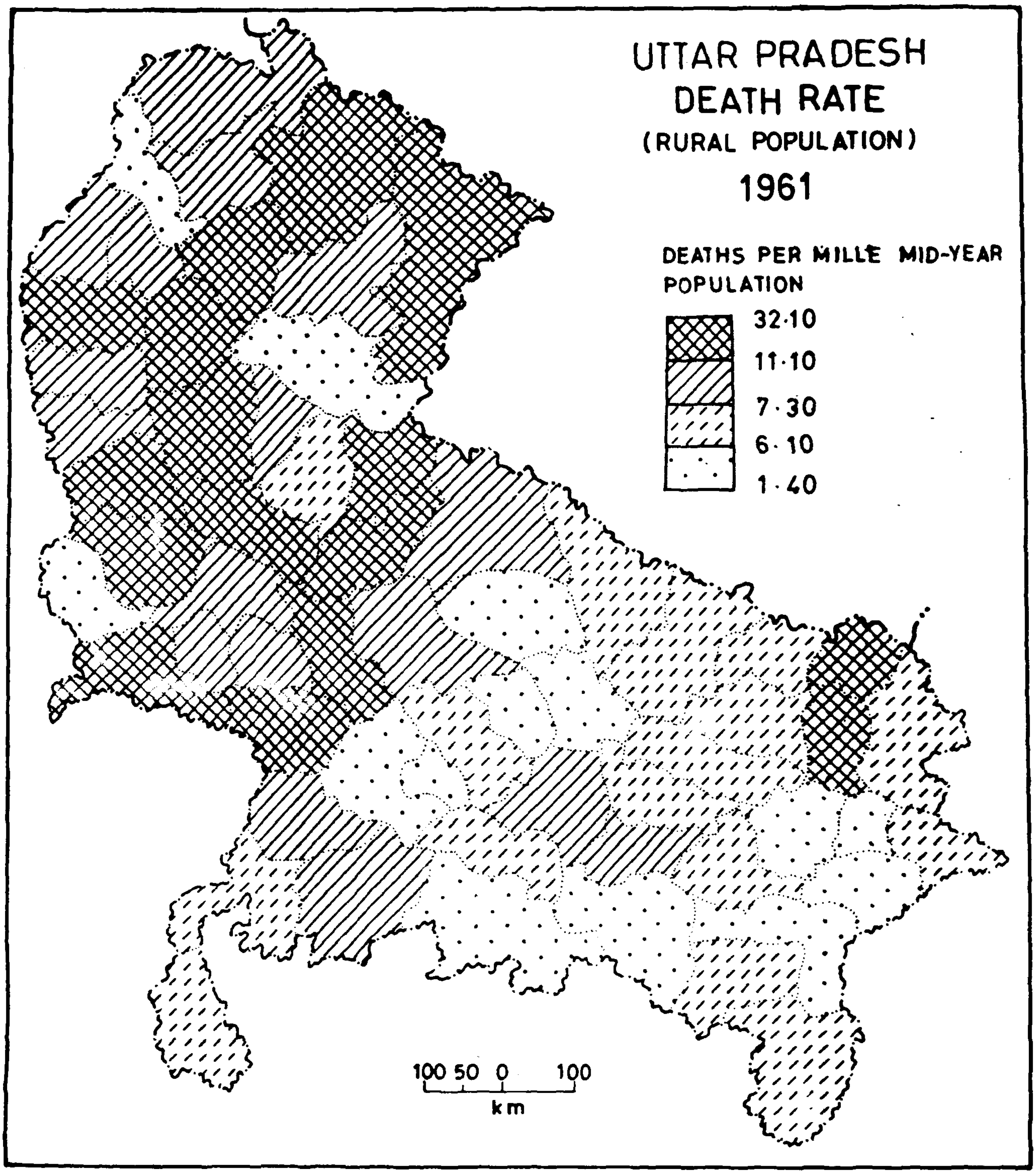
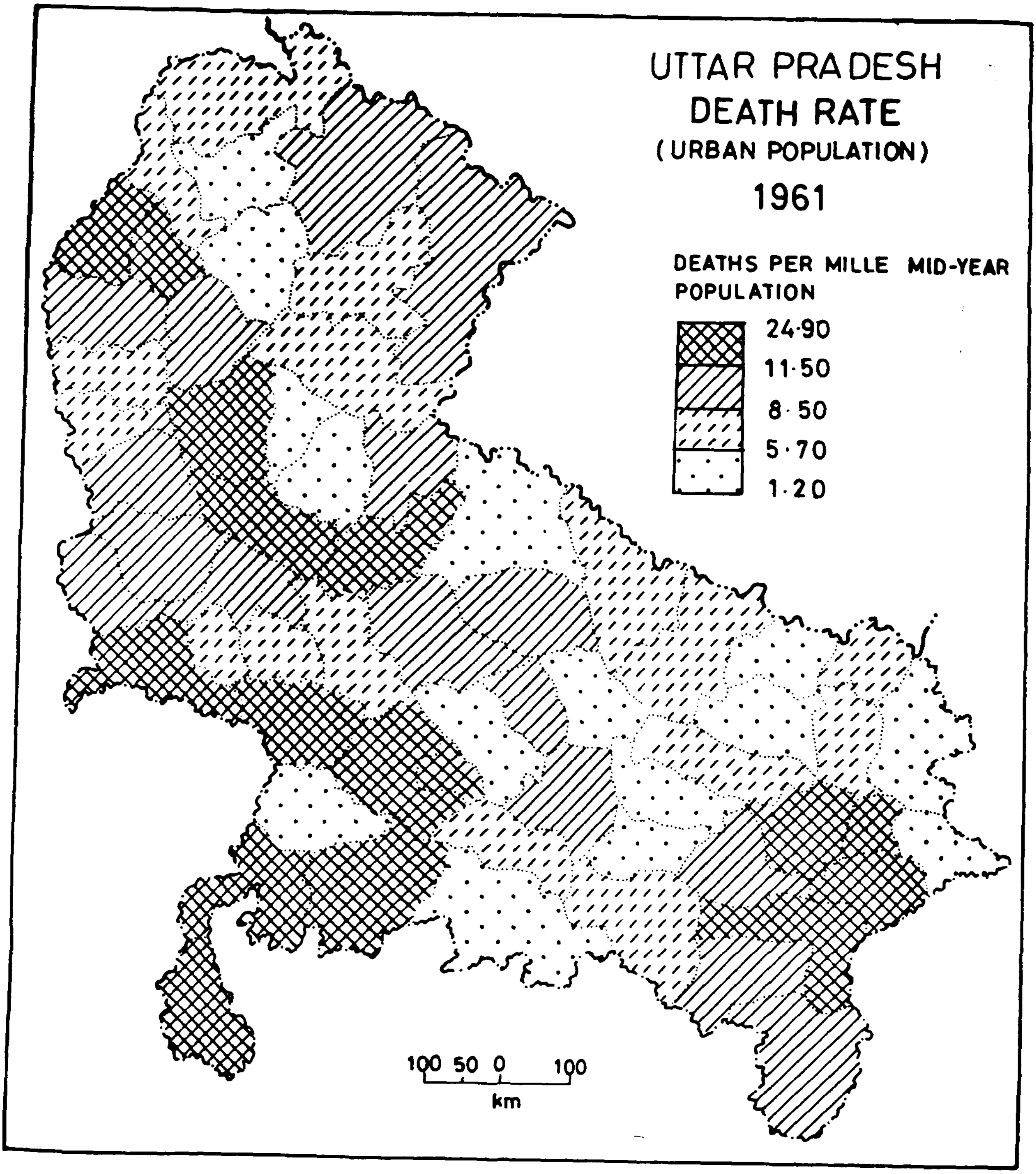

UTTAR PRADESH
DEATH RATE
(RURAL POPULATION)
1961
DEATHS PER MILLE MID-YEAR POPULATION
32·10
11·10
7·30
6·10
1·40
100 50 0 100
km

FIG.52

rates are concentrated in the eastern half of the state. About half of the districts of median to low (7.30 - 6.10) death rates forms a compact region. These districts against their death rates are Bahraich (6.80), Gonda (6.90), Siddharthnagar (6.90), Basti (6.90), Faizabad (6.10), Sultanpur (7.00) and Jaunpur (6.70). This region separates two small regions of low to very low death rates: one lies in the west of it to include Sitapur (1.60), Barabanki (2.30) and Lucknow (1.40) and the other lies in the south-east which comprises seven districts of Azamgarh (3.30), Mau (3.30), Ghazipur (6.00), Varanasi (5.60), Allahabad (5.40) and Banda (3.60). Remaining districts of this slab are scattered over the western half of the state.

In the urban population more than twenty-five per cent districts under high to very high grade of (11.50 - 24.90) death rates form three narrow belts. One which includes about half of the districts of this slab is found in the southwestern part and comprises Agra (12.00), Etawah (16.30), Kanpur Nagar (16.40), Kanpur Dehat (16.40), Hamirpur (12.20), Jhansi and Lalitpur (14.30) districts. Second lies in the western part to include Moradabad (24.90), Budaun (11.60) and Shahjahanpur (11.50), and the third is located in the eastern part of the state and comprises the districts of Azamgarh (18.80), Mau (18.80), Ghazipur (11.70) and Varanasi (19.00). The districts of median to high death rates of 8.50 - 11.50 constitute a discontinuous region in the western and central parts. These districts against their death rates are Bulandshahr (9.30), Aligarh (9.70), Etah (10.10), Mathura (11.30), Hardoi (11.00), Sitapur (9.30), Lucknow (10.70) and Rae Bareli (10.00). Other districts of this slab are scattered over west plain and the Himalayan zone. Therefore, they fail to form any identifiable region. Fig. 53 shows that the majority of the districts of eastern half of the state have the urban death rates below median. Two small regions of median to low (8.50 - 5.70) slab are observed in the state. One, i.e., relatively big is found in the eastern part, it comprises five districts of Bahraich (7.10), Gonda (7.10), Faizabad (5.80), Gorakhpur and Maharajganj (6.80). Other composed of Mainpuri (6.80), Firozabad (6.80) and Farrukhabad (7.80) is found in west plain. It may be pointed out that half of the districts of the Himalayan zone belong to this grade of urban death rates but they are not continuously distributed. They are interrupted by Tehri Garhwal (1.30) and Garhwal (3.30) - the districts of low to very low death rates of 5.70 to 1.20. Two-thirds districts of low to very low death rates of the urban population are scattered in the eastern half of the state. None of the zones include more than three districts.



UTTAR PRADESH
DEATH RATE
(URBAN POPULATION)
1961
DEATHS PER MILLE MID-YEAR POPULATION
24·90
11·50
8·50
5·70
1·20
100 50 0 100
km

FIG.53

Comparing the rural/urban death rates for the same year, it becomes apparent that the urban death rate is higher than rural. To some extent this is correct, but partly it is due to better recording of vital statistics in urban areas. However, the extent of under-registration of deaths in towns appear to be some what greater than that of rural.[09]

Death Rate 1971

General Distribution

The regional distribution of death rate for the year 1971 is shown in Fig.54. Death rate varies from 1.10 in Rampur to 11.10 in Shahjahanpur giving the state average of 3.97. This range of variations is narrower than that of the year 1961. The entire range of variations may be arranged, taking median an average, into four grades of 4.60 - 11.10, 3.10 to 4.60, 2.60 to 3.10 and below 2.60 death rates.

The districts of high to very high death rates of 4.60 - 11.10 form four small regions. One lies in the western part and comprises the districts of Mathura (6.30), Aligarh (6.90), Bulandshahr (10.50), Budaun (7.50) and Shahjahanpur (11.10), second is found in the Himalayan zone and includes three districts of Almora (5.70), Garhwal (7.50) and Pithoragarh (4.60), third lies in the eastern part to include Basti (5.50), Gorakhpur (4.60), Maharajganj

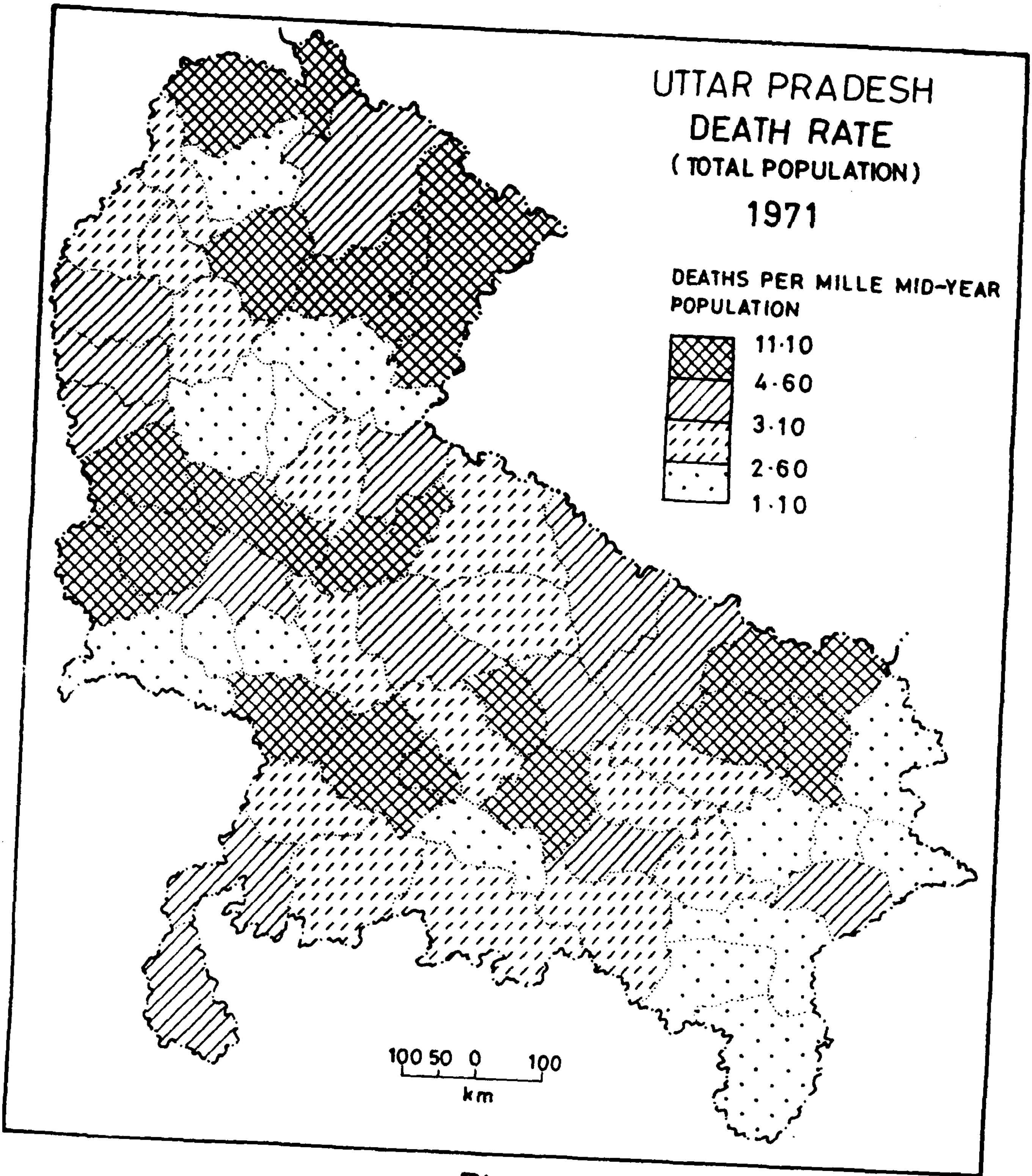

UTTAR PRADESH
DEATH RATE
(TOTAL POPULATION)
1971
DEATHS PER MILLE MID-YEAR POPULATION
11·10
4·60
3·10
2·60
1·10
100 50 0 100
km

FIG.54

(4.60) and Siddharthnagar (5.50) and the fourth is the discontinuous region found in the central part of the state as shown in Fig.54. Only two small zones of median to high death rates (3.10 - 4.60) are observed : one lies in the extreme western part and comprises Ghaziabad (3.90), Meerut (3.90) and Muzaffarnagar (3.80) and the other lies in the northeastern part to include Barabanki (3.60), Bahraich (4.40) and Gonda (3.60). Other districts of this slab are so scattered in the state that they fail to identify any discernible region. About half of the districts of the slab median to low (3.10 - 2.60) forms a distinct region in southcentral part of the state. The other region of the similar grade lies in the northwestern part to include four districts of Dehradun (2.80), Saharanpur (3.00), Hardwar (3.00) and Bijnor (2.60). Seven districts of low to very low death rates (2.60 - 1.10) form an interrupted vertical region in the eastern part, it stretches from Deoria in the north to Sonbhadra in the south. Two small regions each comprised of three districts lie in the western part : one comprises Moradabad (1.80), Rampur (1.10) and Nainital (2.10) districts, and the other Agra (1.50), Firozabad (2.50) and Mainpuri (2.50). Fig.54 depicts that the uniformity in the regions of different grades are interrupted by the districts of relatively high death rates.

Rural/Urban Distribution

The state average and interdistrict range of variation of death rates in the rural population is slightly lesser than that of the urban population. Rural death rates among the districts range from 1.20 in Rampur and Ballia to 11.30 in Shahjahanpur, and the state average accounts for 3.74, whereas the urban death rate varies from 1.00 in Ballia to 13.10 in Kanpur Nagar and Kanpur Dehat, giving the state an average of 4.34. For mapping the districtwise distributions of rural death rates the data are arranged into quartiles of very low to low (1.20 - 2.10), low to median (2.10 - 2.90), median to high (2.90 - 4.30) and high to very high (4.30 - 11.30) death rates. Table 13 shows that twenty-one districts have higher death rates than the state average which infers that there is sharp variations in death rates and they are confined to upper quartile to upper limit. With few exceptions, the pattern of death rates in the rural population is similar to the general population. Fig.55 depicts that one-third districts of high to very high rural death rates forms a compact region in the Himalayan zone and another one-third constitutes a region in the western part. The latter is composed of Shahjahanpur (11.30), Budaun (7.80), Bulandshahr (10.70), Aligarh (6.90) and Mathura (4.90). More than half of the districts of median to high rural death rates form a dominant region in

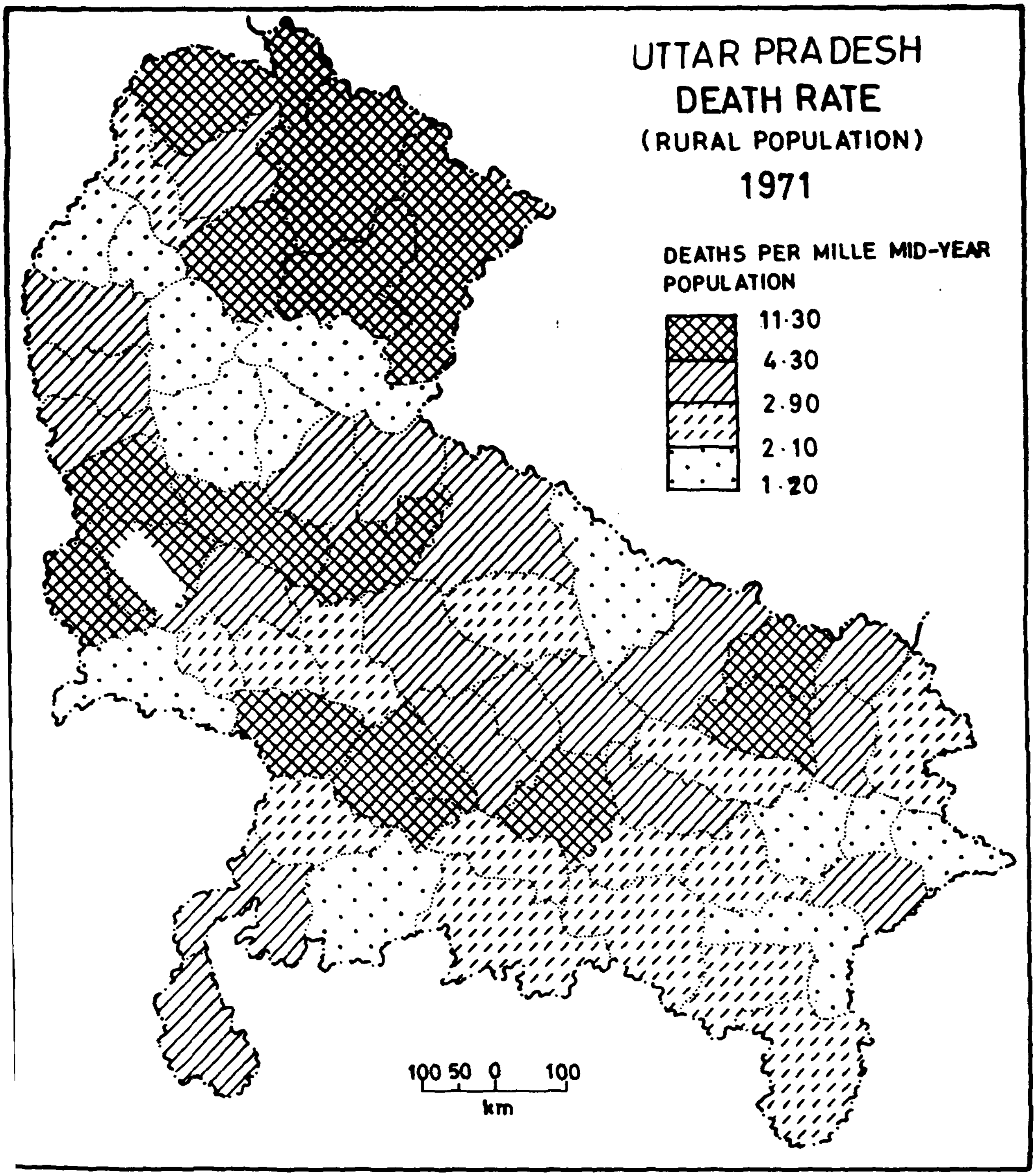

UTTAR PRADESH
DEATH RATE
(RURAL POPULATION)
1971
DEATHS PER MILLE MID-YEAR POPULATION
11·30
4·30
2·90
2·10
1·20
100 50 0 100
km

FIG.55

the central part. Remaining three districts delimit a small region in western part they are Ghaziabad (3.90), Meerut (3.90) and Muzaffarnagar (3.30). Fig.55 reveals that half of the districts of median to low grade of (2.90 - 2.10) rural death rates constitutes a distinct region in the southern part. Remaining districts of this slab are mainly concentrated in the central part. It may be pointed out that six districts of low to very low slab forms a notable region in the western part. These districts against their death rates are Nainital (1.70), Bijnor (1.90), Moradabad (1.80), Rampur (1.20), Hardwar (1.80) and Saharanpur (1.80). Remaining districts are scattered too sporadically in the state to form any identifiable region.

It was noted that in rural areas, village chowkidar reported the deaths in his jurisdiction at the police station. The illiteracy, ignorance and indifference of chowkidar as also the numbers of the family where death may have occurred caused a large gap between the actual number and those which were reported.[10]

The interdistrict variations in death rates of urban population is slightly higher than that of rural population. The median value is found to be 3.70 which is 0.80 point higher than the rural death rate. Fig.56 shows that about half of the western plain districts constitutes a discontinuous region of high to very high urban death rates.

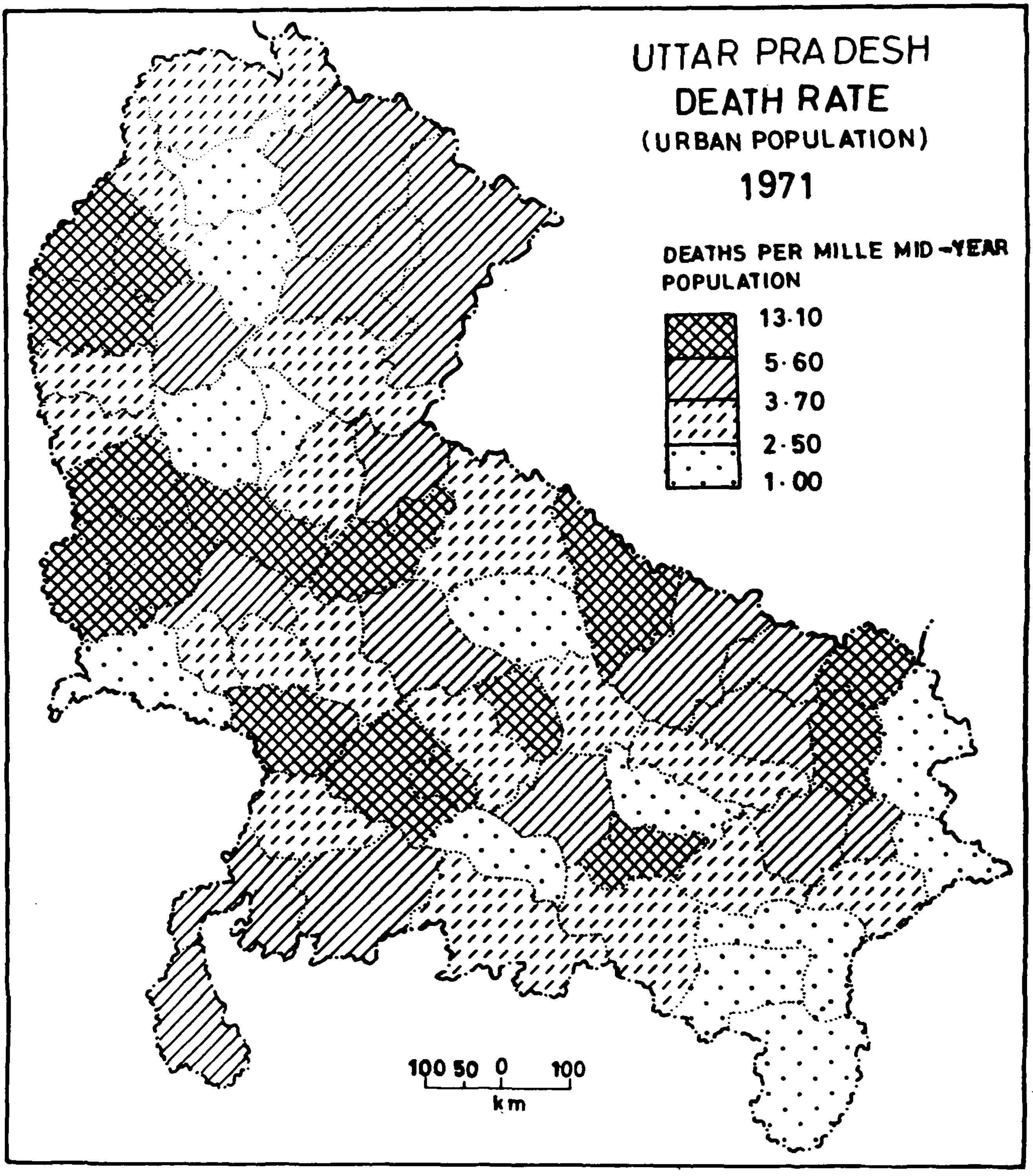

UTTAR PRADESH
DEATH RATE
(URBAN POPULATION)
1971
DEATHS PER MILLE MID-YEAR POPULATION
13·10
5·60
3·70
2·50
1·00
100 50 0 100
km

FIG.56

These districts against their death rates are Shahjahanpur (11.00), Budaun (5.60), Aligarh (6.30), Mathura (8.20), Bulandshahr (8.90), Muzaffarnagar (6.20), Saharanpur and Hardwar (6.30). Other districts of this slab are scattered over central and eastern plains and therefore, they do not form any identifiable region. Three very small regions - each comprised of three districts, of median to high slab are found. One occurs in the Himalayan zone comprised of Chamoli (4.20), Almora (4.10) and Pithoragarh (5.50), second in the plateau region composed of Hamirpur (3.70), Jhansi and Lalitpur (5.00), and third in the east plain to include the districts of Gonda (3.70), Basti and Siddharth-nagar (5.30). A number of small patches of median to low grade of (3.70 - 2.50) death rates in urban population, as shown in Fig.56, are spread over the state. Only a distinct region is identified in the southern part which includes some of the plateau, central and eastern plain districts. Similar is the case with the districts of low to very low urban death rates. However, one-third of them forms a discontinuous region in the eastern part of the plain.

It is observed that in urban areas there being better communication and more literacy among the population, registration is fairly accurate though offenders exist due to the apathy of public to get the events registered. The

TABLE 13

DEATH RATE (No. of deaths permille mid-year population) BY DISTRICTS IN UTTAR PRADESH, 1961-90

District	1961			1971			1981			1990		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Uttar Kashi	10.70	10.80	8.10	7.90	8.40	2.50	3.90	3.70	2.90	1.66	1.33	5.88
Chamoli	11.10	11.20	9.50	4.30	4.30	4.20	4.90	5.50	0.90	1.96	2.25	0.78
Tehri Garhwal	9.20	9.40	1.30	1.80	2.90	1.80	4.30	4.40	1.70	0.27	3.00	1.72
Dehradun	5.30	4.70	6.00	2.80	2.70	2.90	2.50	1.30	3.90	2.73	1.35	4.04
Garhwal	12.40	13.00	3.30	7.50	9.60	1.20	3.60	3.80	1.30	3.53	3.58	3.26
Pithoragarh	11.50	12.50	9.50	4.60	4.60	5.50	1.50	1.40	2.20	1.47	1.45	1.48
Almora	10.30	10.50	5.70	5.70	5.90	4.10	3.30	3.20	5.30	1.71	0.14	7.19
Nainital	4.00	3.60	5.70	2.10	1.70	3.30	1.30	0.60	3.00	1.72	1.43	2.46
Bijnor	11.50	11.70	10.40	2.60	1.90	4.10	2.60	3.00	1.50	1.84	2.21	0.75
Moradabad	30.50	32.10	24.90	1.80	1.80	1.50	3.70	2.40	2.70	1.12	1.02	1.39
Rampur	8.20	10.00	1.20	1.10	1.20	1.10	2.10	3.10	1.10	1.29	1.20	1.54
Saharanpur	8.60	7.30	13.00	3.00	1.80	6.30	2.60	2.30	3.50	1.36	1.58	0.84
Hardwar	8.60	7.30	13.00	3.00	1.80	6.30	2.60	2.30	3.50	1.84	2.23	0.63
Muzaffarnagar	11.20	11.60	8.60	3.80	3.30	6.20	3.70	3.40	4.00	2.19	2.27	1.97
Meerut	8.90	9.60	6.30	3.90	3.90	3.50	3.10	3.30	1.20	1.83	1.04	3.26
Ghaziabad	8.90	9.60	6.30	3.96	3.90	3.50	3.00	3.20	2.50	1.90	1.85	3.04
Bulandshahr	13.30	13.90	9.30	10.50	10.70	8.90	3.10	3.60	0.90	2.52	2.73	1.64
Aligarh	12.10	12.60	9.70	6.90	6.90	6.30	3.30	3.80	1.80	1.17	1.57	1.73
Mathura	5.80	4.70	11.30	6.30	4.90	8.20	2.10	2.50	2.80	1.59	1.10	3.27
Agra	11.60	11.40	12.00	1.50	1.50	1.40	3.20	3.90	3.70	3.74	0.21	10.06
Firozabad	8.80	9.00	6.80	2.50	2.70	2.50	2.10	2.40	0.40	1.82	2.55	0.59
Etah	9.80	9.70	10.10	4.20	4.10	4.30	0.90	0.70	1.20	1.10	1.18	1.37
Mainpuri	8.80	9.00	6.80	2.50	2.70	2.50	2.10	2.40	0.40	1.80	2.49	0.51
Budaun	14.70	15.00	11.60	7.50	7.80	5.60	4.30	4.50	2.80	0.05	0.85	2.45
Bareilly	6.40	7.00	4.40	2.90	2.90	2.80	4.40	4.50	4.10	1.26	0.23	2.91
Pilibhit	11.30	11.50	10.00	3.70	4.20	3.70	0.60	0.40	1.40	1.05	0.93	1.74
Shahjahanpur	11.40	11.40	11.50	11.10	11.30	11.00	2.50	2.90	2.80	4.45	5.18	2.33
Kheri	9.40	9.70	5.40	2.90	3.30	2.50	0.40	0.30	1.30	4.13	3.66	6.03
Sitapur	2.20	1.60	9.30	2.70	2.70	2.30	2.60	2.90	0.70	3.93	3.18	1.98
Hardoi	8.10	7.90	11.00	4.10	4.00	5.30	1.50	1.80	1.80	3.48	1.92	1.74

TABLE 13 (Contd.)

Unnao	7.00	7.10	4.80	3.00	3.00	2.60	4.70	2.10	0.70	2.18	2.17	2.04
Lucknow	6.00	1.40	10.70	7.00	3.40	9.80	4.40	2.30	4.40	7.30	3.61	8.14
Rae Bareli	9.10	9.10	10.00	4.60	5.50	4.60	2.20	1.90	10.20	0.66	0.52	1.99
Farrukhabad	11.10	11.50	7.80	2.70	2.60	2.80	1.60	1.90	0.50	0.58	0.26	2.30
Etawah	11.60	11.10	16.30	4.80	4.50	7.30	2.60	2.80	3.40	1.98	1.66	3.17
Kanpur Dehat	9.90	5.50	16.40	9.50	4.40	13.10	3.10	2.30	3.90	1.75	0.18	8.55
Kanpur Nagar	9.90	5.50	16.40	9.50	4.40	13.10	3.10	2.30	3.90	1.73	0.18	8.55
Jalaun	8.20	8.60	5.70	2.70	2.80	2.50	2.60	2.20	1.00	1.92	0.85	3.04
Jhansi	8.10	6.20	14.30	4.20	2.90	5.00	3.40	2.90	4.00	2.53	0.20	3.33
Lalitpur	8.10	6.20	14.30	4.20	2.90	5.00	4.40	4.30	4.40	9.31	0.17	5.49
Hamirpur	8.10	7.80	12.20	2.60	1.80	3.70	1.40	1.30	1.60	1.42	1.36	1.35
Banda	3.70	3.60	3.00	2.80	2.80	2.50	1.40	1.40	1.10	2.33	2.60	1.19
Fatehpur	6.20	6.20	6.10	2.10	2.10	2.20	1.30	1.30	1.30	1.30	1.14	2.28
Pratapgarh	7.40	7.50	1.80	3.10	2.80	12.10	2.50	2.50	10.80	1.55	1.38	4.05
Allahabad	5.60	5.40	6.50	2.60	2.40	3.00	2.30	1.90	0.30	2.93	2.83	2.86
Bahraich	6.80	6.80	7.10	4.40	1.80	5.60	1.50	1.30	3.90	2.89	2.64	5.75
Gonda	6.90	6.90	7.10	3.60	3.60	3.70	2.10	2.50	2.10	1.08	1.08	1.08
Barabanki	2.40	2.30	4.40	3.60	3.60	2.90	3.30	3.50	1.80	0.88	0.88	0.62
Faizabad	6.10	6.10	5.80	2.70	2.70	2.70	2.20	2.30	0.20	4.04	2.85	11.76
Sultanpur	7.00	7.00	5.10	2.90	2.90	2.40	1.10	0.80	10.60	1.33	0.92	9.11
Siddharthnagar	6.80	6.90	2.60	5.50	6.50	5.30	2.10	2.10	0.60	6.30	6.44	3.40
Maharajganj	12.60	13.10	6.80	4.60	3.30	10.70	2.50	2.50	1.60	1.54	1.44	1.75
Basti	6.80	6.90	2.60	5.50	6.50	5.30	2.10	2.10	0.60	6.30	6.44	3.39
Gorakhpur	12.60	13.10	6.80	4.60	3.30	10.70	2.50	2.50	1.60	1.50	1.43	1.75
Deoria	6.40	6.50	3.30	2.30	2.70	2.20	2.10	2.20	1.10	1.65	1.51	2.41
Mau	4.10	3.30	18.80	2.40	1.90	4.40	2.40	2.50	1.70	0.44	0.30	4.92
Azamgarh	4.10	3.30	18.80	2.40	1.90	4.40	2.40	2.50	1.70	0.43	0.28	4.65
Jaunpur	6.80	6.70	8.50	2.60	2.50	3.20	1.80	1.70	3.80	1.28	1.23	1.43
Ballia	6.00	6.10	3.80	1.20	1.20	1.00	4.00	2.10	22.10	0.45	0.02	4.50
Ghazipur	6.20	6.00	11.70	3.20	3.30	3.00	1.20	1.30	0.70	1.90	1.95	1.01
Varanasi	8.70	5.60	19.00	1.80	1.80	1.60	5.10	3.80	7.40	4.48	3.18	8.70
Mirzapur	7.00	6.70	9.30	2.00	2.10	1.70	0.60	0.50	1.60	0.59	0.04	1.87
Sonbhadra	7.00	6.70	9.30	2.00	2.10	1.70	0.60	0.50	1.60	0.59	0.12	1.88
Uttar Pradesh	8.80	8.60	8.61	3.97	3.74	4.34	2.63	2.48	3.04	2.18	1.71	3.94

Source - Vital Statistics of India, 1961, 1971, 1981 and 1990. The unpublished data of 1990 is obtained from the Directorate of Medical and Health Services, Swasthya Bhavan, Lucknow.
The data of some of the districts were not available, they had been adjusted from the previous records and the data of adjacent districts.

unreliability of deaths reported have been stressed from time to time by various authorities.[11]

Death Rate 1981

General Distribution

The number of deaths per mille mid-year population varies from district to district with a maximum of 5.10 in Varanasi and a minimum of 0.40 in Kheri giving an average of 2.63 for the state in 1981 (Table 13). This range of variations is almost half of the interdistrict variations recorded in 1971. The interdistrict distribution of death rates in 1981 is grouped into quartiles of very low to low (0.40 - 1.80), low to median (1.80 - 2.50), median to high (2.50 - 3.30) and high to very high (3.30 - 5.10) (Fig.57). The regions so demarcated in the state show that majority of the districts of death rates of above median are concentrated in the western part. Five Himalayan districts form a region of high to very high death rates. Besides, two regions of this slab are distinctly observed in the state : one lies in the western part and comprises Moradabad, Bareilly, Budaun and Aligarh and the other in the central part to include Barabanki, Lucknow and Unnao. Other districts are scattered over the state and therefore, they do not constitute any identifiable region. A

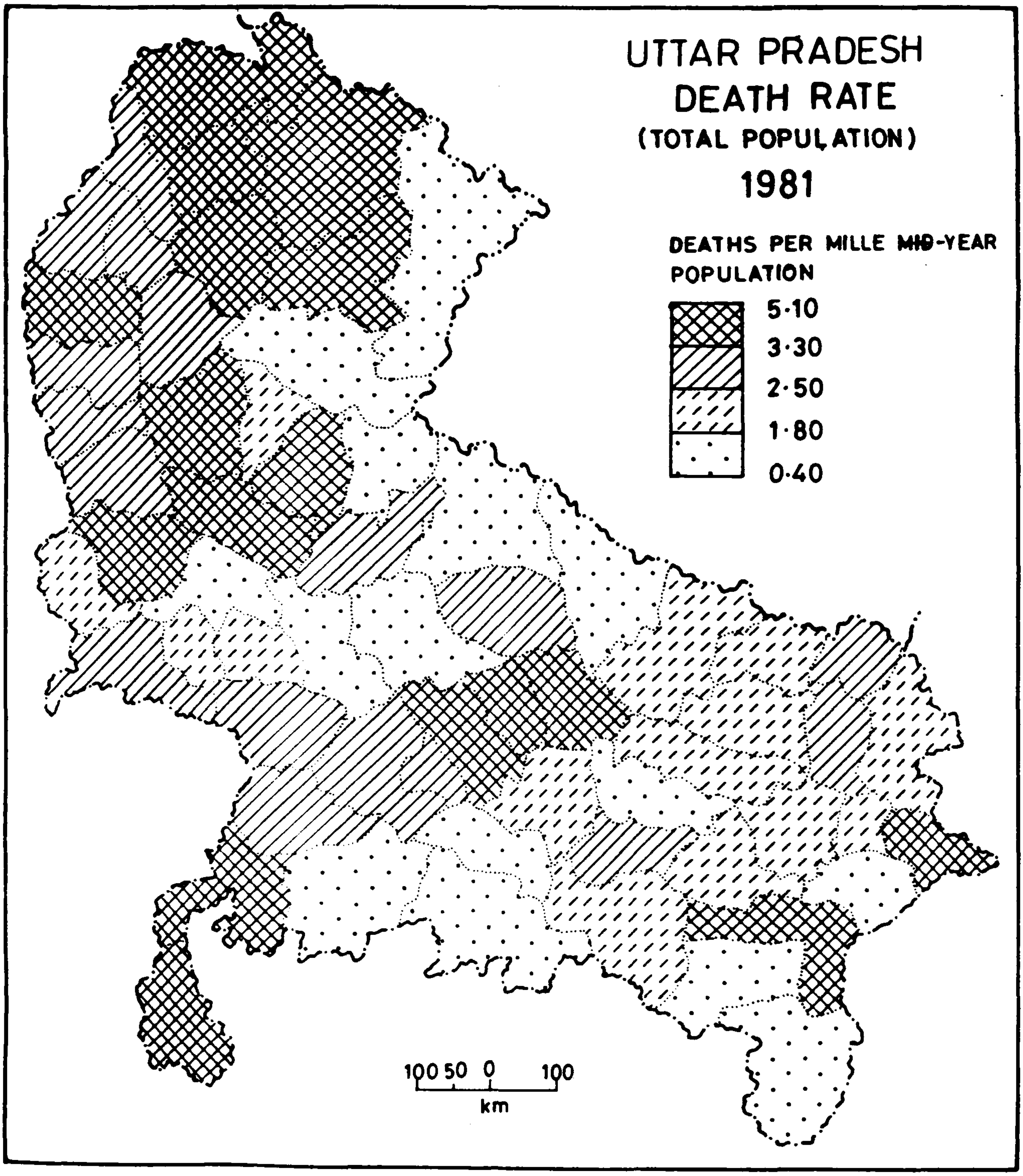

UTTAR PRADESH
DEATH RATE
(TOTAL POPULATION)
1981
DEATHS PER MILLE MID-YEAR POPULATION
5·10
3·30
2·50
1·80
0·40
100 50 0 100
km

FIG.57

discontinuous large region of median to high slab of death rates is found on the western margin of the state. It stretches from Dehradun in the north to Jalaun in the south and it comprises ten districts out of fifteen. About same number of other districts of median to low death rates form a big region in the eastern part. The districts of this region against their death rates are Gonda (2.10), Siddharthnagar (2.10), Basti (2.10), Faizabad (2.20), Jaunpur (1.80), Allahabad (2.30), Rae Bareli (2.20), Azamgarh (2.40), Mau (2.40) and Deoria (2.10). The districts of low to very low slab of death rates are not uniformly distributed. However, they form two prominent regions. One comprised of half of the districts of this slab, lies in central section of the western half which extends from Pithoragarh in the north to Bahraich in the east and Etah in the southwest. The other interrupted by Allahabad - a district of median to low slab, is identified in the southern part. It is composed of the districts of Fatehpur (1.30), Hamirpur (1.40), Banda (1.40), Mirzapur and Sonbhadra (0.60) as shown in Fig.57.

Rural/Urban Distribution

The interdistrict variations in death rates of rural population in 1981 is narrower (0.30 - 5.50) than that of the urban population (0.20 - 22.10). The state average for rural death rate (2.48) is 0.56 point less than that of the urban population (3.04). The median value of the district-wise urban death rate is similar to the lower quartile of the rural death rate. It may be pointed out further that regional distribution of death rates in rural population is also similar to that of general population in the state. Fig.58 shows that two notable regions of relatively high to very high rural death rate (3.20 - 5.50) are found in the western half of the state. One comprises five Himalayan districts of Uttar Kashi (3.70), Chamoli (5.50), Tehri Garhwal (4.40), Garhwal (3.80) and Almora (3.20), and the other comprises seven west plain districts of Muzaffarnagar, Meerut, Ghaziabad, Bulandshahr, Aligarh, Budaun and Bareilly. The other districts of similar grade are scattered too sporadically to form any identifiable region. Fig.58 depicts that there are a number of small regions of median to high (2.40 - 3.20) slab which are scattered over the state. Half of the districts of median to low slab constitutes a compact region in the central part of the state. Three districts form a small region in the north-eastern part to include Siddharthnagar, Basti and Faizabad. This region is detached from two districts - Deoria and Ballia, of similar grade by Gorakhpur.

A distinct narrow belt of low to very low death rates is observed in the eastern part of the Himalayan zone

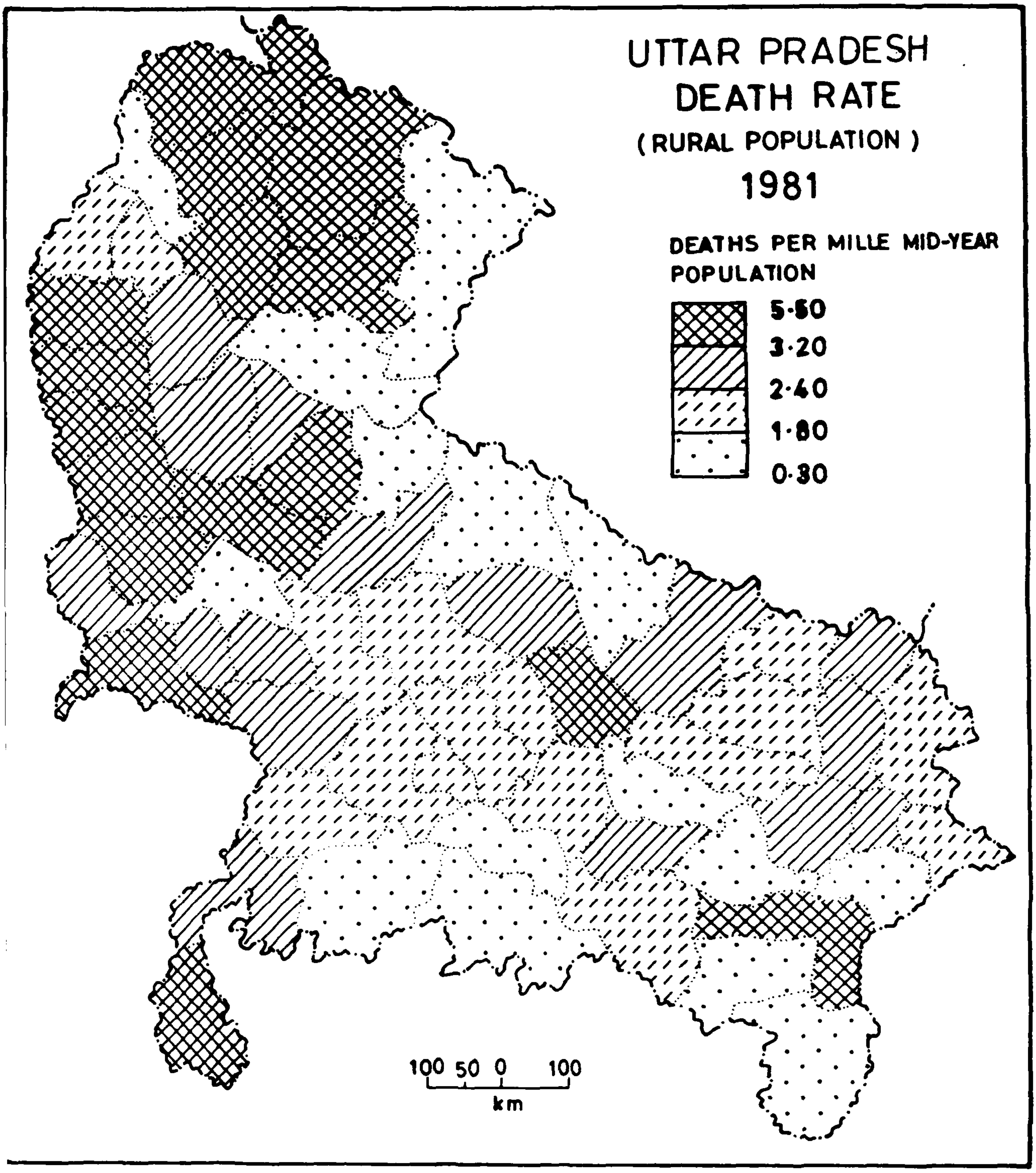

UTTAR PRADESH
DEATH RATE
(RURAL POPULATION)
1981
DEATHS PER MILLE MID-YEAR POPULATION
5·50
3·20
2·40
1·80
0·30
100 50 0 100
km

FIG.58

and west plain. Small patches of this grade are found in the southern, eastern and southeastern parts of the state.

The regional distribution of death rates in the urban population varies from 0.20 to 22.10, the upper limit is followed by the district having about less than half of death rate, i.e., 10.80 in Pratapgarh. The interdistrict variations may be set into four grades : two of below median (0.20 to 1.10 and 1.10 to 1.80) and two of above median (1.80 to 3.80 and 3.80 to 22.10). Fig.59 shows that concentration of districts of high to very high death rates in urban has been shifted to the eastern half of the state where they form a narrow belt mainly in the southern part of the central and east plains. The other districts of similar grade are scattered over the state, therefore, they fail to constitute any distinct region. It may be seen in Fig.59, that big region of median to high urban death rates (1.80 - 3.80) comprised of overwhelming majority of the districts lies in the western half of the state. There are three notable patches of median to low slab. One lies in the northwestern part to include Tehri Garhwal, Garhwal, Bijnor and Meerut, second lies in the northeastern part to comprise Maharajganj, Gorakhpur, Deoria, Mau and Azamgarh, and the third composed of Fatehpur, Hamirpur, Banda, Mirzapur and Sonbhadra forms an interrupted zone. The districts of low to very low death rates in urban population do not form any

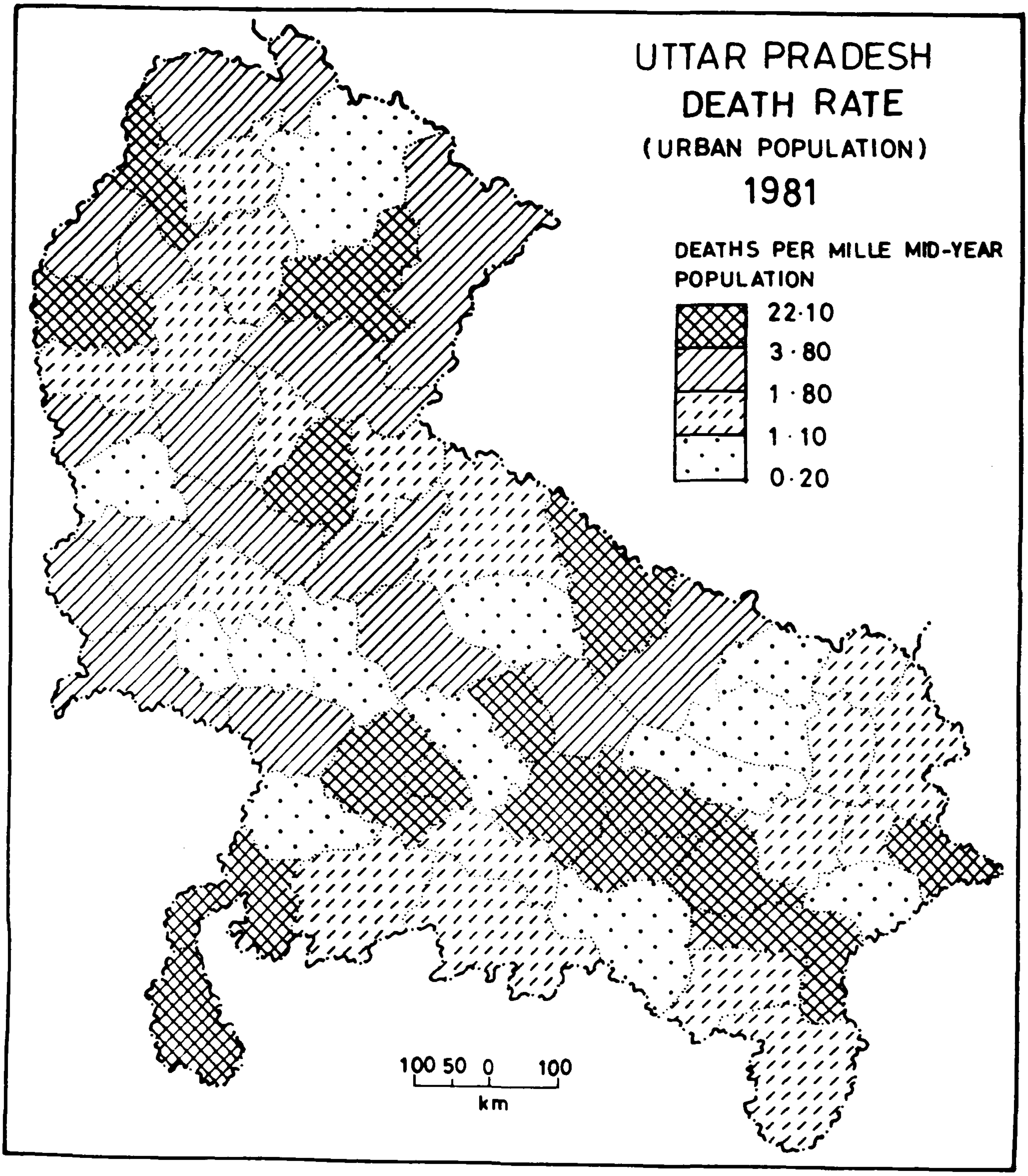

UTTAR PRADESH
DEATH RATE
(URBAN POPULATION)
1981
DEATHS PER MILLE MID-YEAR POPULATION
22·10
3·80
1·80
1·10
0·20
100 50 0 100
km

FIG.59

big region, they, however, constitute two small regions: one comprises of four districts of Firozabad, Mainpuri, Farrukhabad and Unnao, and other includes Faizabad, Basti and Siddharthnagar districts. The overall distribution of death rates in the state in 1981 with few exceptions, do not depict any notable pattern.

In the overall patterns of distribution of death rates in 1981, it is observed that there is lower death rates in rural population than the urban population, it may be due to better registration systems in the urban areas.[12]

Death Rate 1990

General Distribution

The regional distribution of death rates (the number of deaths per mille mid-year population) varies from 0.05 in Budaun to 9.31 in Lalitpur whereas the state average accounts for 2.18 in 1990. This average is slightly lower than that of the previous decade. Table 13 shows that about two-thirds districts have the death rates below 2.00.

The distribution of interquartile grades of death rates in 1990 depicts some distinct regions (Fig.60). Two continuous zone of high to very high (2.53-9.31) death rates are formed in the northern part of the plain. One, i.e., larger contains the six districts of Bahraich (2.89), Kheri (4.13), Shahjahanpur (4.45), Hardoi (3.48), Sitapur

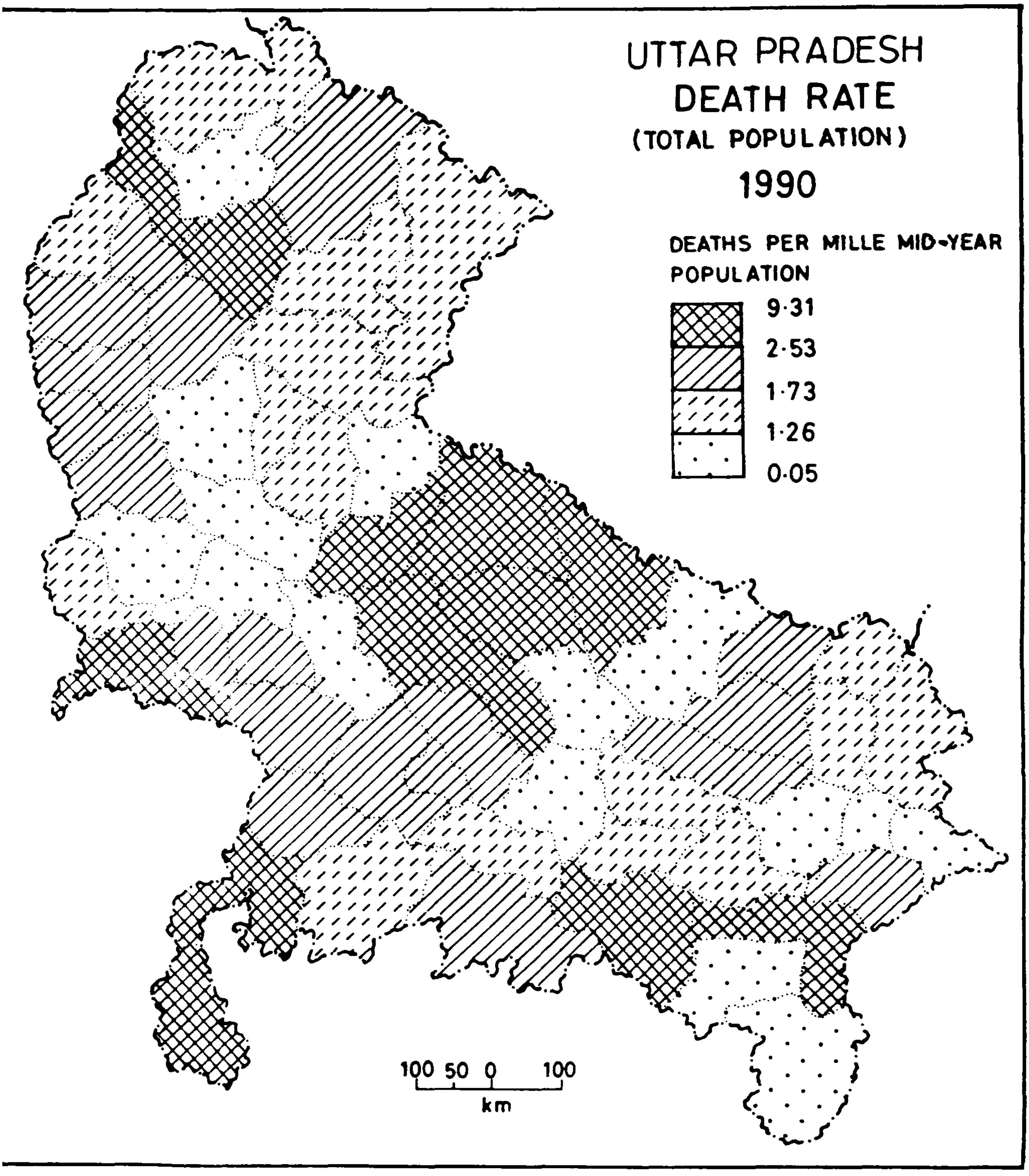

UTTAR PRADESH
DEATH RATE
(TOTAL POPULATION)
1990
DEATHS PER MILLE MID-YEAR POPULATION
9·31
2·53
1·73
1·26
0·05
100 50 0 100
km

FIG.60

(3.93) and Lucknow (7.30), while the latter comprises Siddharthnagar (6.30), Basti (6.30) and Faizabad (4.04). Three mini regions containing two districts each are found: one lies in the Himalayan zone, second in the plateau region and the third in the eastern plain. Majority of the districts of median to high (1.73 - 2.53) death rates are concentrated in the Ganga - Yamuna doab. They alongwith some districts at periphery form two distinct regions : one stands in the northwestern part to include six districts of Bijnor (1.84), Hardwar (1.84), Muzaffarnagar (2.19), Meerut (1.83), Ghaziabad (1.90) and Bulandshahr (2.52). The other is constituted in southwestern parts to comprise Mainpuri, Firozabad, Etawah, Kanpur Dehat, Kanpur Nagar, Unnao and Jalaun districts. Two eastern districts of west plain and three Himalayan districts combinedly form a prominent region of median to low (1.73 - 1.26) death rates. Other region of the same grade lies in the eastern half of the state, it includes districts of Hamirpur (1.42), Fatehpur (1.30), Pratapgarh (1.55), Sultanpur (1.33) and Jaunpur (1.28). About one-third districts scattered over the state fails to delimit a distinct region. Three mini regions of low to very low slab of (1.26 - 0.05) death rates are found in the plain. One, i.e., relatively big lies in the western part and comprises five districts of Moradabad (1.12), Budaun (0.05), Aligarh (1.17), Etah (1.10) and Farrukhabad

(0.58), second lies in the central part of the plain to include Gonda, Barabanki, and Rae Bareli districts and the third in the eastern part which comprises three districts of Ballia (0.45), Azamgarh (0.43) and Mau (0.44).

Rural/Urban Distribution

The death rate is marked with notable variations in its distribution in rural and urban population of the districts. The average death rate of the rural population is almost identical with that of the total population. The state average for the urban population exceeds the death rate of the rural population by a little over 2.23 points per mille.

The distribution of rural death rates varies narrowly from 0.02 in Ballia to 6.44 in Siddharthnagar and Basti districts, whereas the state average accounts for 1.71. All the districts of the state may be grouped into four grades applying quartile technique as shown in Fig.61. Figure shows that overwhelming majority of the districts of relatively high to very high (2.49 - 6.44) death rates are mainly concentrated in the eastern half of the state, where two-thirds of the districts form an interrupted region in almost northern part of the plain. Three districts of this slab constitute a small region in the southern part to include Banda (2.60), Allahabad (2.83) and Varanasi (3.18).

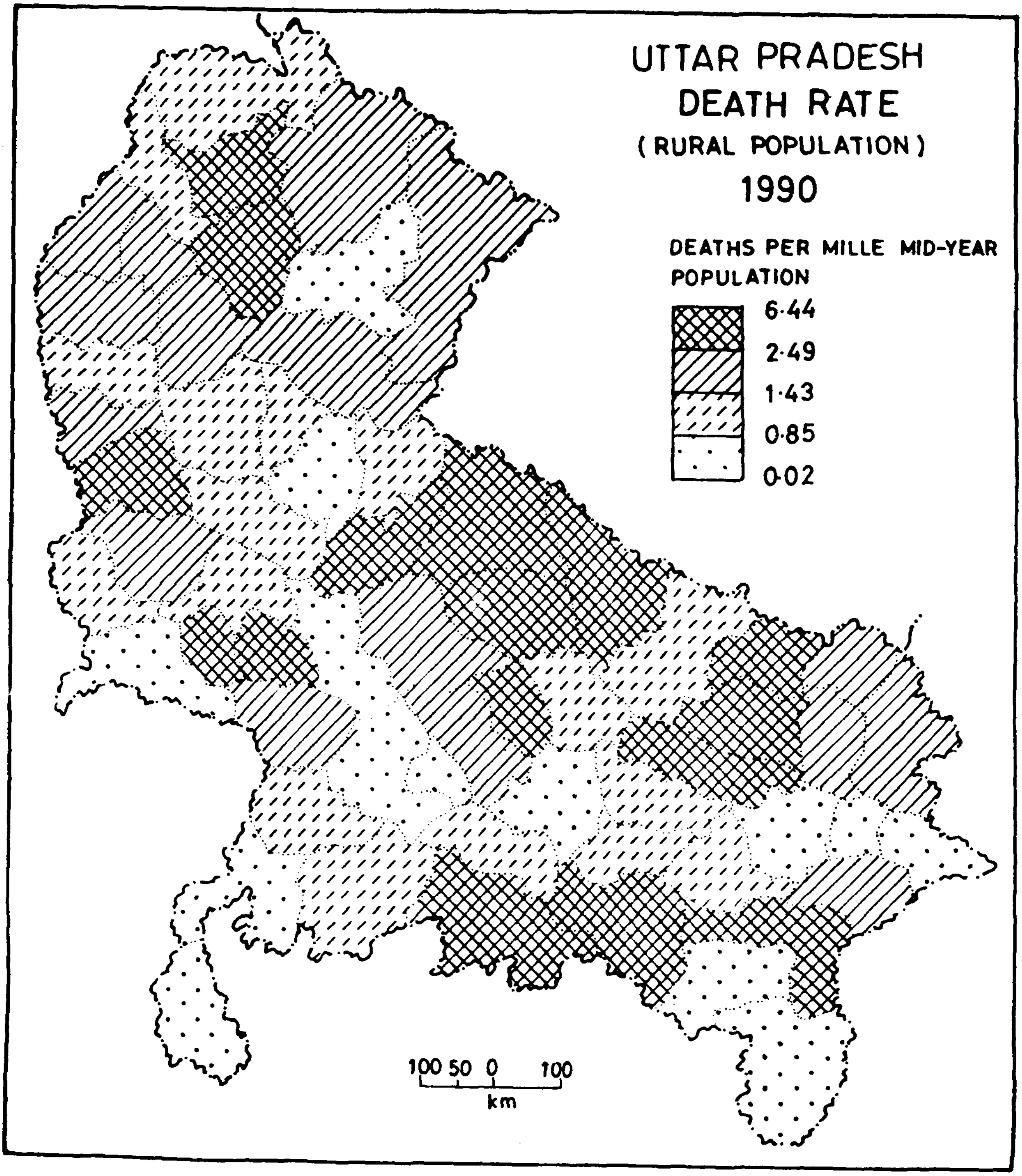

UTTAR PRADESH
DEATH RATE
(RURAL POPULATION)
1990
DEATHS PER MILLE MID-YEAR POPULATION
6·44
2·49
1·43
0·85
0·02
100 50 0 100
km

FIG. 61

About half of districts of median to high (1.43 - 2.49) death rates form a dominant region which comprises some west plain districts of Saharanpur, Hardwar, Muzaffarnagar and Bijnor, and the Himalayan districts of Chamoli (2.25), Pithoragarh (1.45) and Nainital (1.43). Some central districts and eastern districts are far apart therefore, they do not delimit any identifiable region. The districts of median to low (1.43 - 0.85) rural death rates form two distinct regions comprised of fourteen districts. Eight of them delimit almost a discontinuous region in the central part stretching from the plateau districts of Jalaun and Hamirpur to northeastern district of Gonda. Remaining six districts form a continuous region in western part and comprises western plain districts of Meerut (1.04), Moradabad (1.02), Rampur (1.20), Budaun (0.85), Etah (1.18) and Mathura (1.10). Table 13 shows that about nineteen districts out of the sixty-three record rural death rates of below 1.00. Sixteen districts of them belong to low to very low death rates of 0.85 to 0.02, and two-thirds of them lie in the eastern half of the state where they do not constitute regions of comprising more than three districts.

Among the districts, the urban death rates vary from 0.51 to 11.76 with the minimum in Mainpuri and the maximum in Faizabad. It will be seen that the highest value of urban death rates is one-and-a-half times higher than the

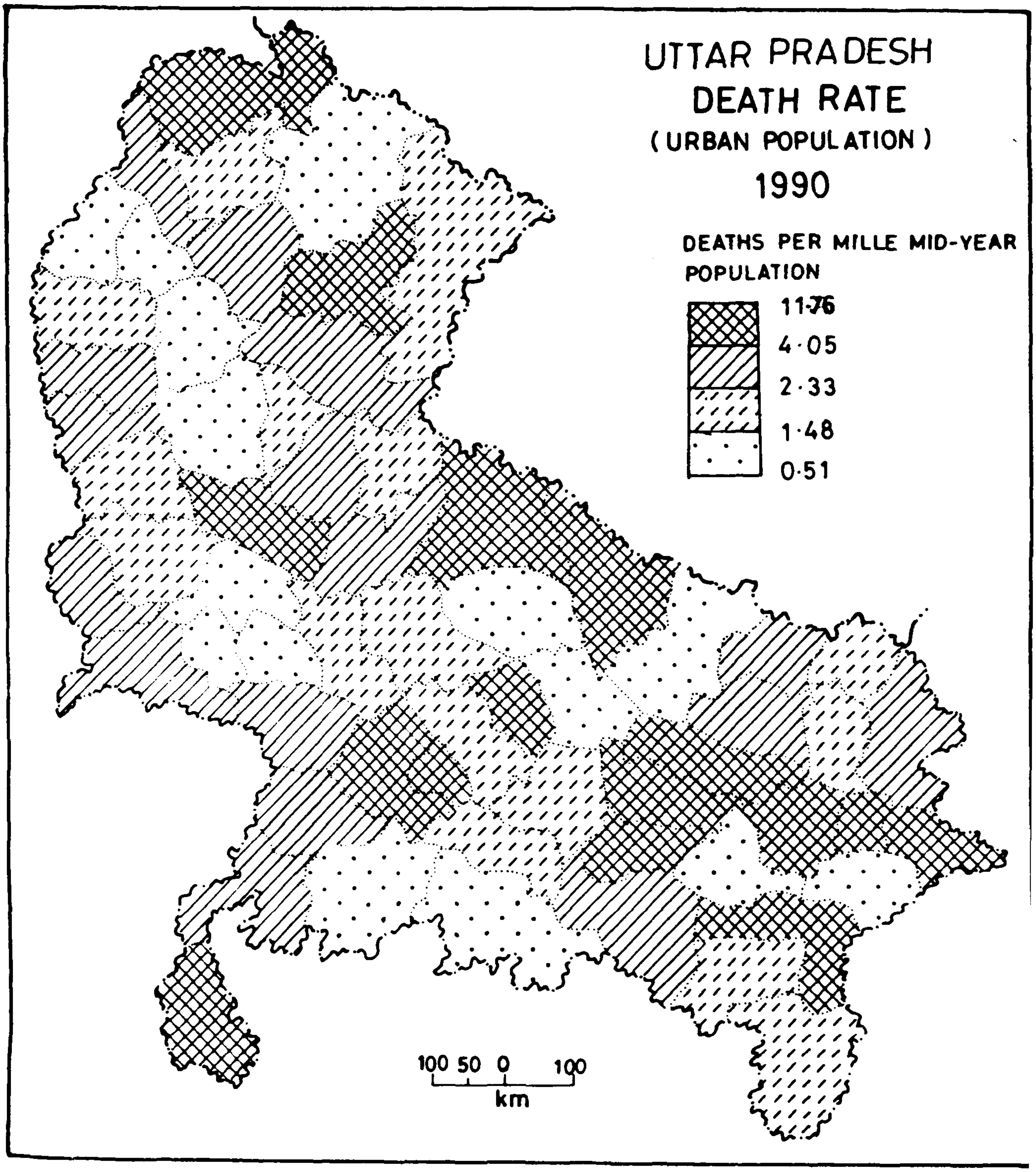

UTTAR PRADESH
DEATH RATE
(URBAN POPULATION)
1990
DEATHS PER MILLE MID-YEAR POPULATION
11·76
4·05
2·33
1·48
0·51
100 50 0 100
km

FIG.62

rural death rates. Fig.62 shows that there is concentration of the districts of relatively high urban death rates (4.05 - 11.76) in the eastern half of the state. They combinedly constitute discontinuous region interrupted by the districts of below median urban death rates. The similar is the case with the districts of median to high slab in this part. However, in the western part three districts - Dehradun (4.04), Garhwal (3.26) and Nainital (2.46) of the Himalayan zone and two west plain districts (Bareilly and Shahjahanpur) form a distinct region in the northern part of the state. Remaining districts of the same interval are scattered over the western part of the state. One-third districts of median to low grade of (2.33 - 1.48) urban death rates form a distinct region in the central part. They against their death rates are Fatehpur (2.28), Rae Bareli (1.99), Unnao (2.04), Hardoi (1.74) and Farrukhabad (2.30). A number of small regions of low to very low (1.48 - 0.51) death rates of the urban population are found in the state. Two of them are found in the western part - one comprised four districts of Saharanpur, Hardwar, Bijnor and Moradabad, and other includes three districts of Etah, Firozabad and Mainpuri. The other region of almost the same size and grade lies in the northern part of the central and east plains to include Sitapur, Barabanki and Gonda. Two districts of low to very low index lie in the plateau region and another two in the eastern plain as shown in Fig.62.

Infant Death Rate 1961

General Distribution

India and Uttar Pradesh carry a tremendous burden of infant mortality though the total infant death rate, i.e., the number of deaths per mille live births of population of below one year of age. Fig.63 shows that overwhelming majority of the districts of median to higher grades of infant death rates are found in the western half of the state. The districts lying under relatively high to very high infant death rates (129-243) are scattered. Some of them constitute two distinct regions, containing each three districts. One lies in the central part and comprises three districts of Sitapur (235), Hardoi (129) and Unnao (141), and the other lies in the south to include three plateau districts of Hamirpur (185), Jhansi (144) and Lalitpur (144). About two-thirds districts of median to high infant death rates (83 - 129) constitute a distinct region in the western part surrounded by the discontinuous districts of high to very high slab. The districts of median to low infant death rates (83 - 52) have narrow range of variations, they do not constitute any prominent region. Two small regions,

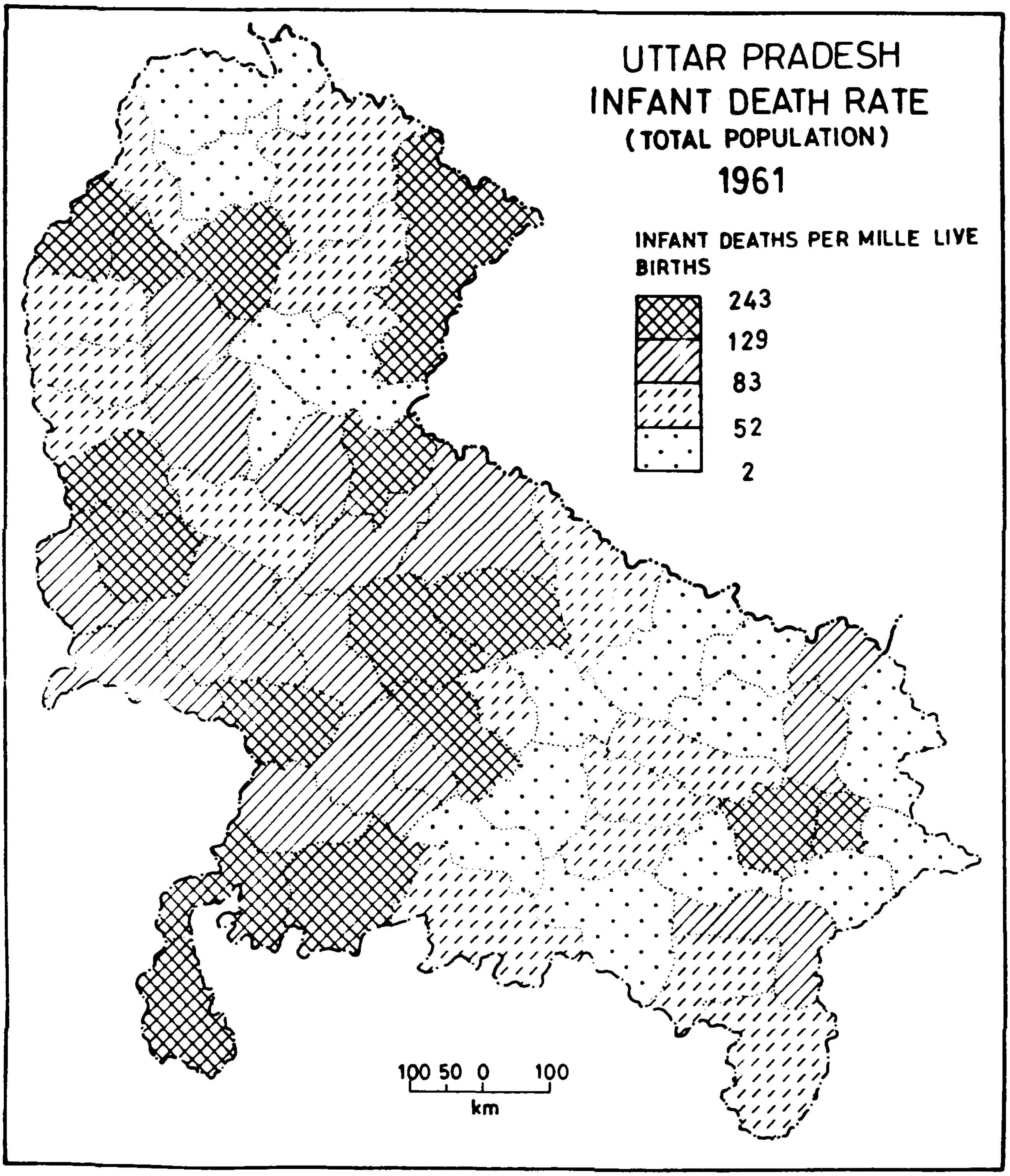

UTTAR PRADESH
INFANT DEATH RATE
(TOTAL POPULATION)
1961
INFANT DEATHS PER MILLE LIVE BIRTHS
243
129
83
52
2
100 50 0 100
km

FIG. 63

containing each three districts of this slab are found. One comprises three districts of Faizabad (53), Sultanpur (66) and Pratapgarh (61) of central plain and the other includes three districts of Ghaziabad (77), Meerut (77) and Muzaffarnagar (58). Three districts of the Himalayan zone and three of plateau region belong to this slab but they do not form identifiable region. A dominant region of low to very low infant death rates (52 - 2) is found in the eastern half of the state. It surrounds the small region of relatively high slab and occupies two-thirds districts of its grade. Three Himalayan districts of Uttar Kashi (20), Tehri Garhwal (36) and Nainital (46), and Rampur (41) a district of west plain having two sets of small patches are separated by Garhwal (140) a district of relatively very high slab.

Rural/urban Distribution

The patterns of distribution of rural and urban infant death rates in 1961 are quite different. But distribution of rural infant death rate is almost similar to the general distribution. However, it has slightly wide range of variations with almost the districts in same region (Table 14) and the state average is slightly higher (0.63 point) as compared to infant death rates in total population. Though the state average of urban infant death

TABLE 14

INFANT DEATH RATE (No. of infant deaths per mille live births) BY DISTRICTS IN UTTAR PRADESH, 1961-90

District	1961			1971			1980			1990		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Uttar Kashi	20	20	19	70	71	70	13	20	68	17.14	20.10	186.00
Chamoli	72	75	71	63	63	60	10	9	52	20.77	9.86	10.83
Tehri Garhwal	36	36	35	25	27	12	29	30	21	24.10	25.02	45.92
Dehradun	56	48	60	13	32	11	11	21	7	11.11	6.78	13.28
Garhwal	140	144	57	57	66	11	4	3	21	8.91	9.96	3.47
Pithoragarh	135	135	134	38	40	35	15	16	15	7.33	6.47	27.72
Almora	73	76	27	38	43	40	11	8	32	26.73	6.96	83.56
Nainital	46	63	23	30	32	29	20	11	28	15.47	15.24	16.15
Bijnor	90	89	93	28	24	35	6	2	23	1.17	12.00	10.10
Moradabad	96	77	154	45	45	43	11	4	29	25.13	33.89	19.90
Rampur	41	45	9	10	28	2	32	78	9	7.21	8.18	1.59
Saharanpur	163	167	156	30	22	41	12	4	31	15.45	10.10	57.22
Hardwar	163	167	156	30	22	41	12	4	31	1.00	12.00	10.12
Muzaffarnagar	58	55	73	42	42	40	8	1	16	9.92	3.95	32.00
Meerut	77	80	66	44	44	43	6	3	11	11.36	33.52	0.30
Ghaziabad	77	80	66	44	44	43	6	3	29	16.36	21.62	17.13
Bulandshahr	183	198	89	180	189	85	3	1	22	19.04	15.12	0.70
Aligarh	142	148	113	54	54	50	42	62	31	12.99	13.42	0.05
Mathura	87	94	78	35	28	40	9	11	23	28.50	35.71	8.37
Agra	118	161	80	60	60	58	16	10	7	0.48	8.64	51.38
Firozabad	83	87	38	39	50	39	27	27	24	60.00	60.52	155.25
Etah	101	96	139	42	38	64	13	7	31	25.50	35.13	15.56
Mainpuri	83	87	38	39	50	39	27	27	24	55.11	51.41	153.24
Budaun	61	57	88	36	34	45	16	6	44	5.94	4.65	10.13
Bareilly	86	93	105	38	38	36	41	62	128	12.55	0.81	0.71
Pilibhit	141	145	124	5	7	5	15	15	18	1.32	0.83	9.37
Shahjahanpur	119	126	94	115	117	90	12	4	39	16.90	15.80	41.53
Kheri	102	109	40	16	34	9	4	9	7	19.04	17.40	25.72
Sitapur	235	236	235	31	31	30	31	31	31	15.79	15.42	34.25
Hardoi	129	132	103	56	65	8	44	53	14	42.27	31.92	23.53
Unnao	141	141	136	46	47	32	16	17	4	26.20	29.80	15.00

TABLE 14 (Contd.)

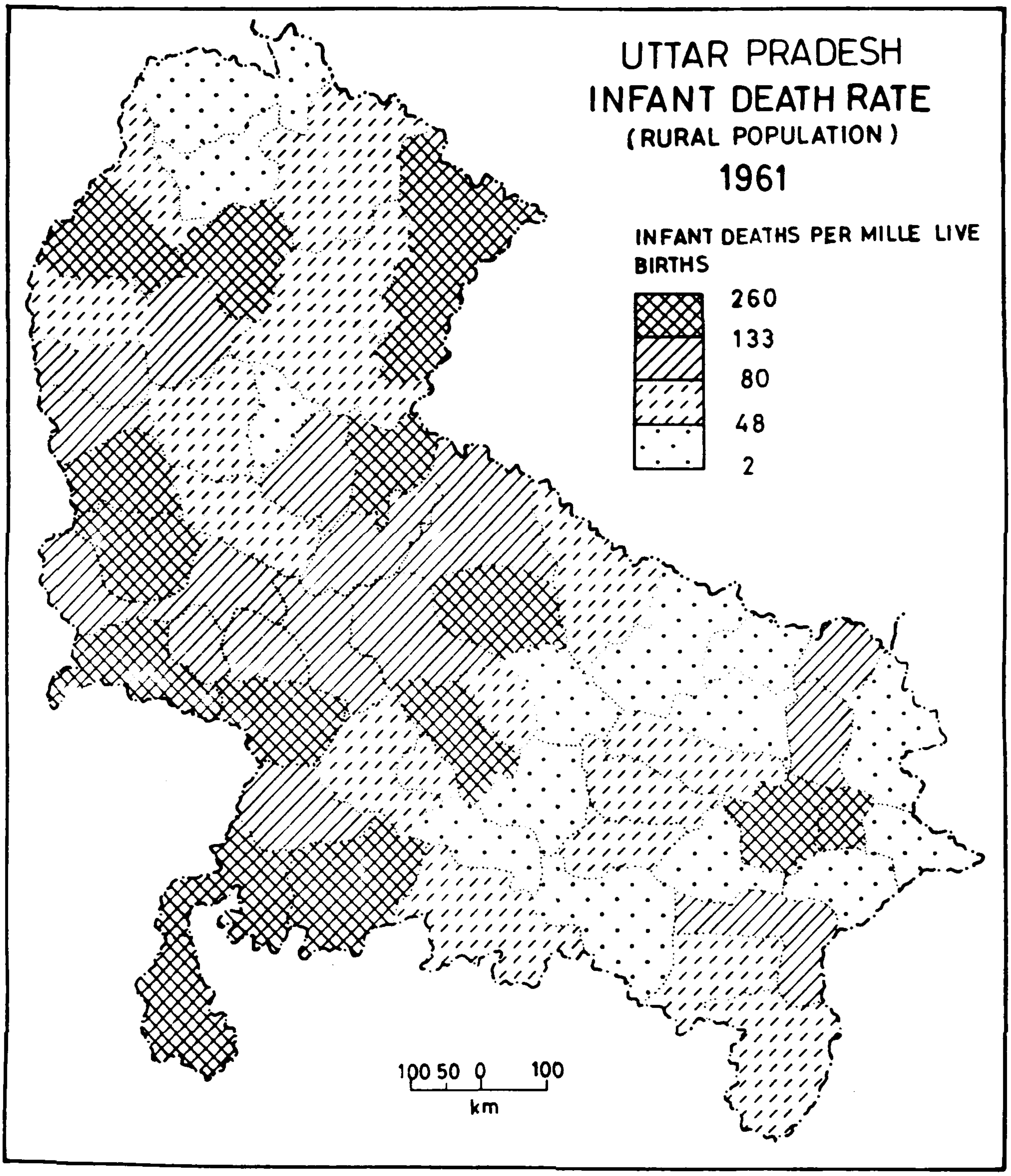
Lucknow	75	61	75	115	46	131	19	27	34	20.04	13.19	24.28
Rae Bareli	37	36	55	3	7	3	23	18	44	8.52	3.77	29.15
Farrukhabad	114	119	75	37	36	37	34	35	17	37.27	83.39	53.56
Etawah	243	260	175	67	67	68	35	21	52	6.68	5.34	21.92
Kanpur Dehat	126	51	189	228	57	348	38	17	52	10.95	0.35	114.45
Kanpur Nagar	126	51	189	228	57	348	38	17	52	10.00	0.14	114.42
Jalaun	97	98	97	42	30	60	12	21	45	11.07	8.09	4.30
Jhansi	144	175	112	18	27	14	24	11	27	26.80	26.10	109.00
Lalitpur	144	175	112	18	27	14	10	9	16	1.30	10.48	13.52
Hamirpur	185	182	201	21	19	50	10	7	37	0.81	0.77	0.71
Banda	59	62	33	26	26	25	6	7	14	8.28	8.32	46.10
Fatehpur	40	39	63	50	72	9	20	20	14	6.68	6.73	57.22
Pratapgarh	61	61	60	55	47	139	16	6	29	9.70	7.29	31.76
Allahabad	48	41	64	27	48	15	43	62	10	16.27	17.42	45.56
Bahraich	52	48	81	47	22	47	32	10	98	8.24	71.88	45.45
Gonda	27	22	102	26	44	43	17	22	28	49.06	16.50	138.50
Barabanki	18	17	30	35	36	14	31	20	8	14.71	15.30	43.39
Faizabad	53	56	44	45	48	36	17	17	14	7.22	6.02	9.40
Sultanpur	66	66	62	32	33	31	10	1	43	11.40	5.40	48.79
Siddharthnagar	10	9	70	43	43	40	9	9	11	2.25	2.45	3.25
Maharajganj	106	111	71	23	27	18	8	7	28	3.00	7.25	43.60
Basti	10	9	70	43	43	40	9	9	11	2.08	2.24	3.22
Gorakhpur	106	111	71	23	27	18	8	7	28	2.98	7.20	43.53
Deoria	2	2	54	1	31	30	7	6	6	5.90	6.06	45.00
Mau	158	133	268	23	21	29	8	8	15	4.50	5.20	23.45
Azamgarh	158	133	268	23	21	29	8	8	15	3.40	5.15	23.01
Jaunpur	28	26	200	24	23	25	11	4	59	2.62	2.58	3.54
Ballia	4	2	34	4	4	4	17	9	55	11.40	0.09	1.59
Ghazipur	24	22	42	29	35	15	1	1	23	7.64	0.85	12.83
Varanasi	102	120	120	36	36	70	48	18	49	26.69	37.36	18.99
Mirzapur	58	50	89	21	24	5	11	11	16	17.17	20.99	17.78
Sonbhadra	58	50	89	21	24	5	11	11	16	18.00	21.50	17.82
Uttar Pradesh	88.30	88.93	90.83	43.78	42.22	44.00	17.86	16.64	29.63	14.81	15.64	34.34

Source - Vital Statistics of India, 1961, 1971, 1980 and 1990. The unpublished data of 1990 is obtained from the Directorate of Medical and Health Services, Swasthya Bhavan, Lucknow.

The data of some of the districts were not available, they had been adjusted from the previous records and the data of adjacent districts.

rate is relatively high, being 90.83 which may be caused by relatively proper registration in the urban areas. The interdistrict variations have a sharper range running from a maximum of 268 in Azamgarh and Mau followed by Sitapur (235) to a minimum of 9 in Rampur. The spatial distribution of rural and urban infant death rates in the state are shown in Fig.64 and Fig.65. Fig.64 shows that the majority of districts of western half of the state records rural infant death rate more than the median value with the exception of a contiguous region of median to low infant death rates (80-48) comprised of Budaun (57), Moradabad (77), Nainital (63), Almora (76) and Chamoli (75). The districts of median to low slab are scattered over the eastern half of the state. Only three districts fall in this slab. They are Faizabad (56), Sultanpur (66) and Pratapgarh (61). A continuous region composed of all the districts of low to very low (48-2) rural infant death rates, except Uttar Kashi (20) and Tehri Garhwal (36), is found in the eastern half of the state. Fig.64 also gives plausible explanation for relatively high slab of infant death rates in rural population.

Though the infant death rate in urban population is some what higher than that in rural population, its range of interdistrict variation is almost identical with that of the rural population. The interdistrict distribution does



UTTAR PRADESH
INFANT DEATH RATE
(RURAL POPULATION)
1961
INFANT DEATHS PER MILLE LIVE BIRTHS
260
133
80
48
2
100 50 0 100
km

FIG. 64

not give a clear pattern, however, some of the distinct regions of different grades are identified. Fig.65 shows that two regions of high to very high infant death rates (120-268) in urban population are found. One lies in south-western part and comprises five districts of Unnao (136), Kanpur Nagar (189), Kanpur Dehat (189), Etawah (175) and Hamirpur (201), second lies in the eastern plain region and comprises four districts of Varanasi (120), Jaunpur (200), Azamgarh and Mau (268). In the west of former, a notable region of median to high slab (78-120) is recorded which comprises about half of the districts of this slab. These districts in descending order of urban infant death rates are Aligarh (113), Bareilly (105), Hardoi (103), Shahjahanpur (94), Bulandshahr (89), Budaun (88), Agra (80) and Mathura (78). Another small distinct region formed under this grade lies in the plateau section to include the districts of Jalaun, Jhansi and Lalitpur. Two small patches of this grade, each comprised of two districts, are found in the eastern half : one in northeastern part and the other in southeastern part of the state. The districts of central part and some of the eastern part constitute the small region of low slab of below median - median to low (78-57) and low to very low (57-09) infant death rates in the urban population. Some districts of these slabs are scattered over western and the northern parts. With the exception of

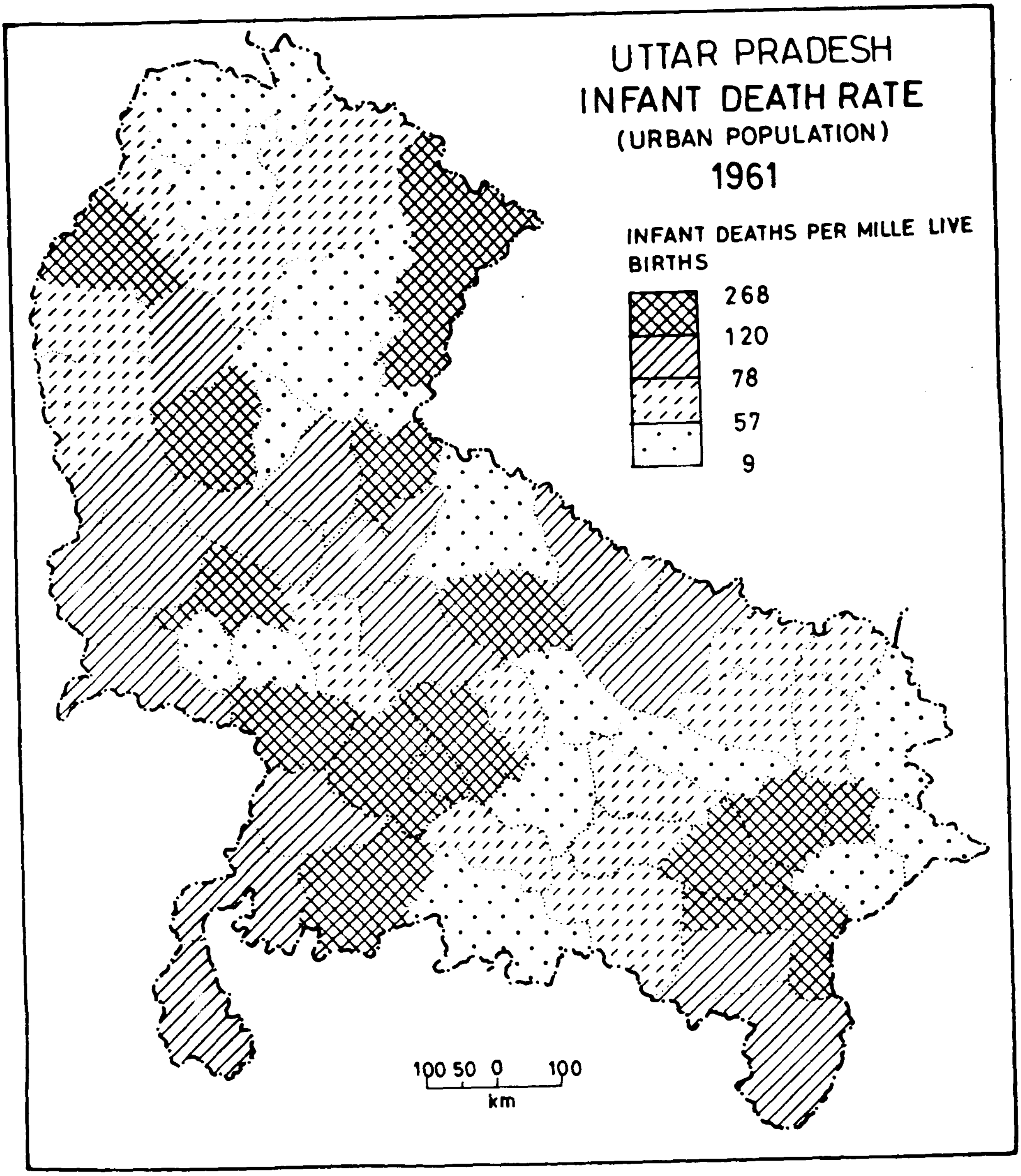

UTTAR PRADESH
INFANT DEATH RATE
(URBAN POPULATION)
1961
INFANT DEATHS PER MILLE LIVE BIRTHS
268
120
78
57
9
100 50 0 100
km

FIG.65

Pithoragarh (134), all the districts of the Himalayan zone report their share below the state average.

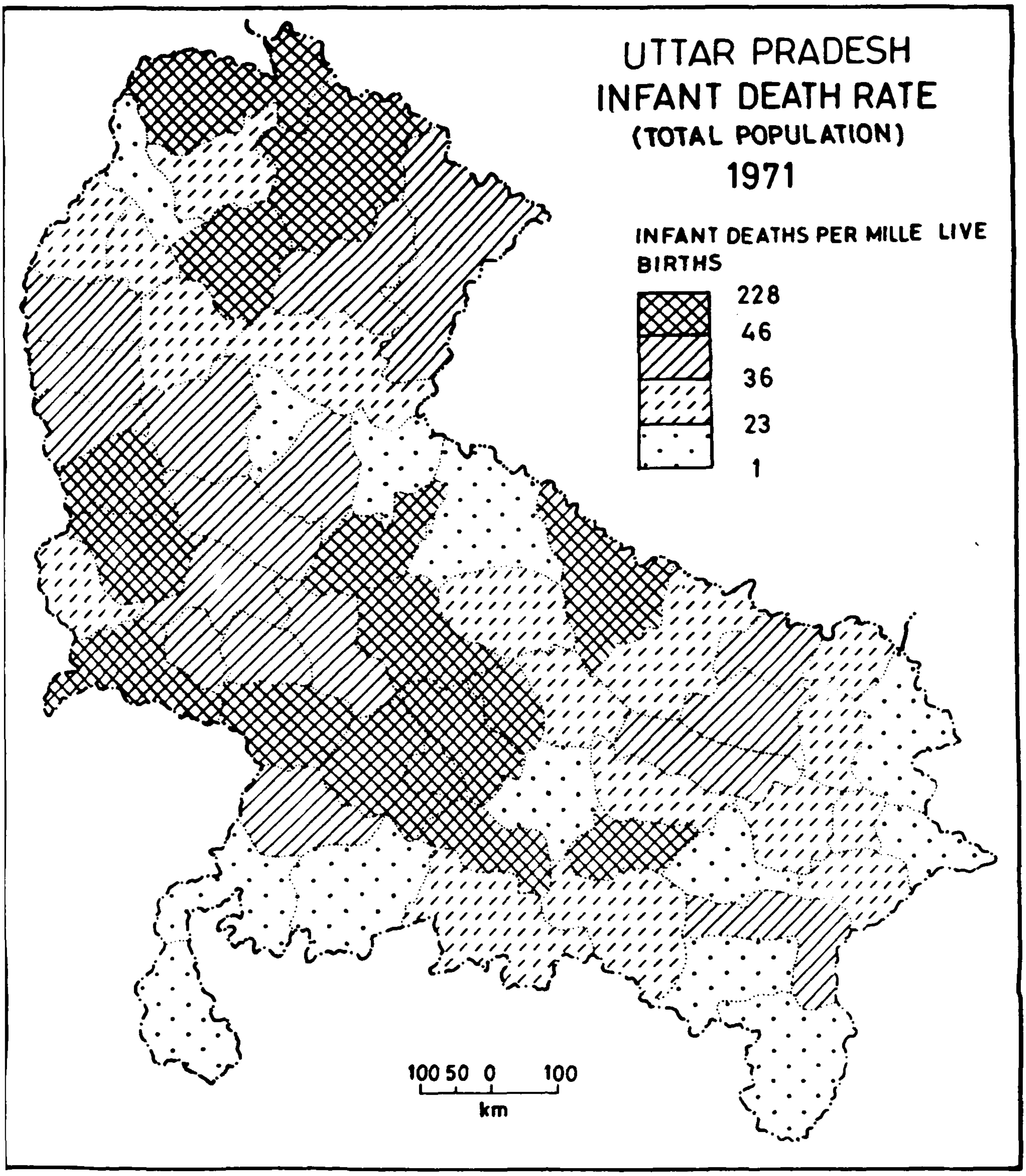
Analysing the infant death rates by rural/urban it will be evident that the rate is higher in urban areas than in the rural. Partly, it is because of better registration and, partly because of unhealthy surrounding and overcrowding found in urban areas.[13]

An analysis of the infant death rates for urban areas shows that a wide divergence exists among them (Table 14). The low infant death rates of certain urban areas might be due to under-registration. Some urban districts have the higher infant death rates due to overcrowding and the pollution of air by smoke. A large number of families of mill labourers dwell in congested localities and occupy substandard houses beyond the reach of the sun and fresh air.[14]

Infant Death Rate 1971

General Distribution

The pattern of regional distribution of infant death rates in 1971 is observed to be low over the previous year 1961. The state average is recorded to be almost half, i.e., 43.78 infant deaths per mille live births. The inter-district variations in infant death rates range from 1.00 in


UTTAR PRADESH
INFANT DEATH RATE
(TOTAL POPULATION)
1971
INFANT DEATHS PER MILLE LIVE BIRTHS
228
46
36
23
1
100 50 0 100
km

FIG·66

Deoria to 228 in Kanpur Nagar and Kanpur Dehat followed by 180 in Bulandshahr. The infant death rates of the districts arranged into quartiles, as shown in Fig.66, depict that median value is less than half of the value reported in 1961. Table 14 shows that about sixty-five per cent of the districts lie below the state average which infer the sharper variations are found at the higher side of the scale. Fig.66 shows that three-fourths districts of high to very high infant death rates (46-228) form a discontinuous region in western and central part of the state. Three districts of the same slab constitute a small region in the Himalayan zone, these districts are Uttar Kashi (70), Chamoli (63) and Garhwal (57). The other prominent region of median to high infant death rates (36-46), is in the western part, it runs from Muzaffarnagar in the northwest to Farrukhabad in the southeast. An other region of similar grade, lies in the eastern part, which includes Siddharth-nagar (43), Basti (43) and Faizabad (45). Two small regions of median to low infant death rate are observed. One, i.e., relatively large in size is found in the eastern half and the other lies in the northern part to include the districts of Nainital (30), Bijnor (28), Hardwar (30) and Saharanpur (30. Three districts - Tehri Garhwal (25), Banda (26) and Allahabad (27), of similar grade are far apart therefore, they fail to constitute even a small region.

Fig.66 shows that the district of relatively low to very low infant death rates are scattered over the state, therefore, they do not form an identifiable region.

Rural/Urban Distribution

The infant death rates by residence also tended to decline from 1961 to 1971 and the rate of decline is almost similar to the general infant death rate. Interdistrict range of variations of infant death rates in the rural population (4-189 per mille live births) is lesser than in urban population (2-348 per mille live births). If the two extreme values of 189 in Bulandshahr and 348 in Kanpur Dehat and Kanpur Nagar may be deleted the range of variations for rural population will be 4-117 and for urban population 2-139. However, for showing the distributions of infant death rates on map the quartiles of 4 to 27, 27 to 36, 36 to 48 and 48 to 189 are used for rural population and quartiles of 2 to 15, 15 to 36, 36 to 47 and 47 to 348 are used for urban population. Fig.67 shows that more than half of the districts of mainly Ganga-Yamuna doab and two districts of Shahjahanpur (117) and Hardoi (65) form a narrow belt of high to very high rural infant death rates. Three Himalayan districts - Uttar Kashi (71), Chamoli (63) and Garhwal (66) of similar slab constitute a small region. In the immediate right of this region, a discontinuous zone of median to high

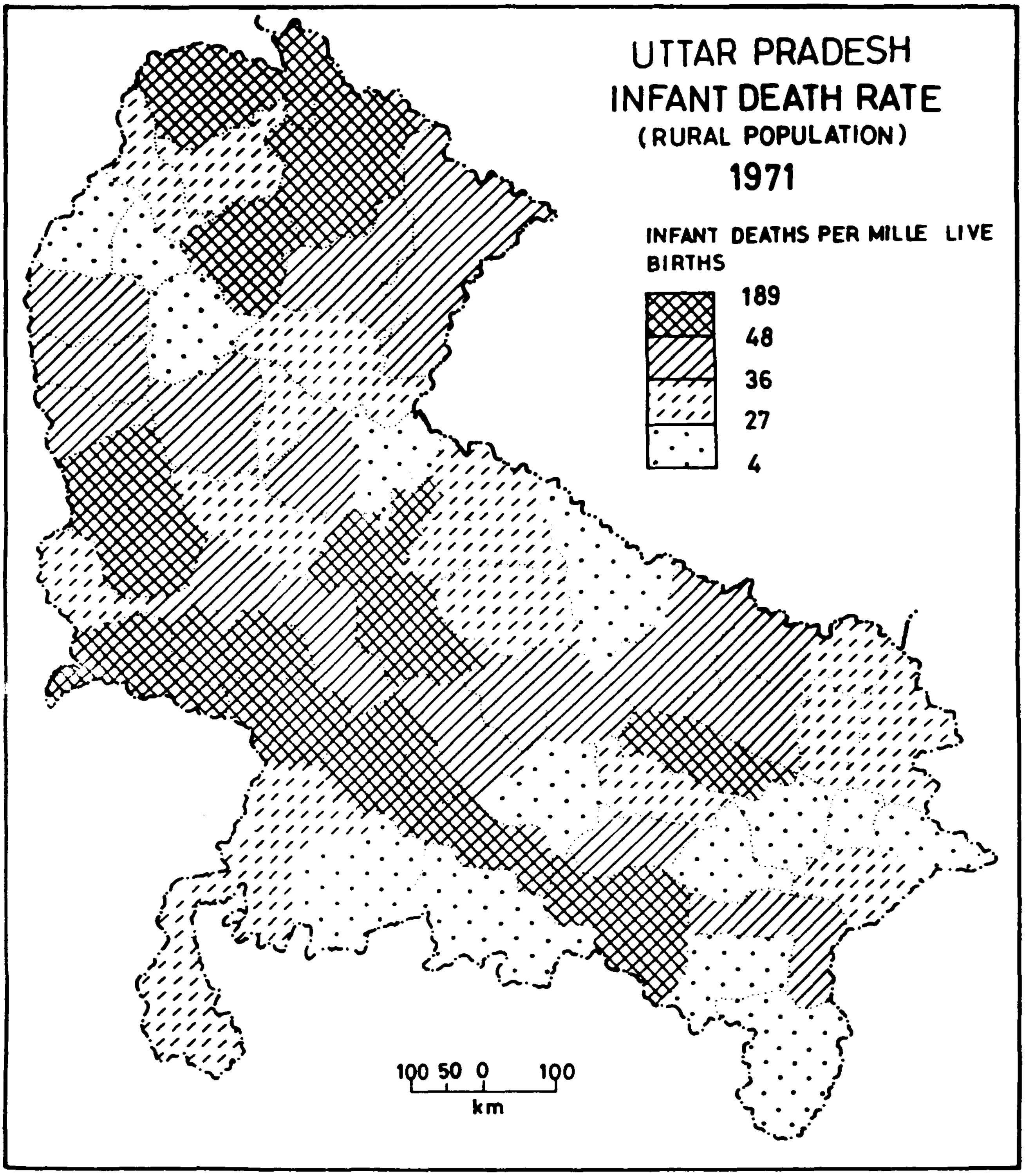

UTTAR PRADESH
INFANT DEATH RATE
(RURAL POPULATION)
1971
INFANT DEATHS PER MILLE LIVE BIRTHS
189
48
36
27
4
100 50 0 100
km

FIG-67

grade of infant death rates is found, which looks like crescent, stretched from Muzaffarnagar in the northwest to Unnao in the centre and Siddharthnagar in the northeastern part of the state. Small patches of below median rural infant death rates are found all over the state. None of the region of median to low slab comprises more than three districts. They generally occupy the peripherical districts of the state. Fig.67 gives a plausible explanation.

It is notable that in urban population about twenty-six per cent of the districts have infant death rates have the state average. It identifies that very sharp interdistrict variations in urban infant death rates are found at the higher side of the scale. Table 14 shows that about three-fourths of the districts record below 50 infant death rates in the urban population. The range of upper quartile to upper limit of infant death rates is very wide (47-348) and more than half of the districts of this slab identifies a narrow belt in the southwestern part which stretches from Bulandshahr in the north to Hamirpur in the south (Fig.68). Almost all the districts of very high urban infant death rates - Shahjahanpur (90), Lucknow (131), Pratapgarh (139) and Varanasi (70), are far apart therefore, they fail to constitute any identifiable region. It may be inferred that their highest record is chance occurrence.

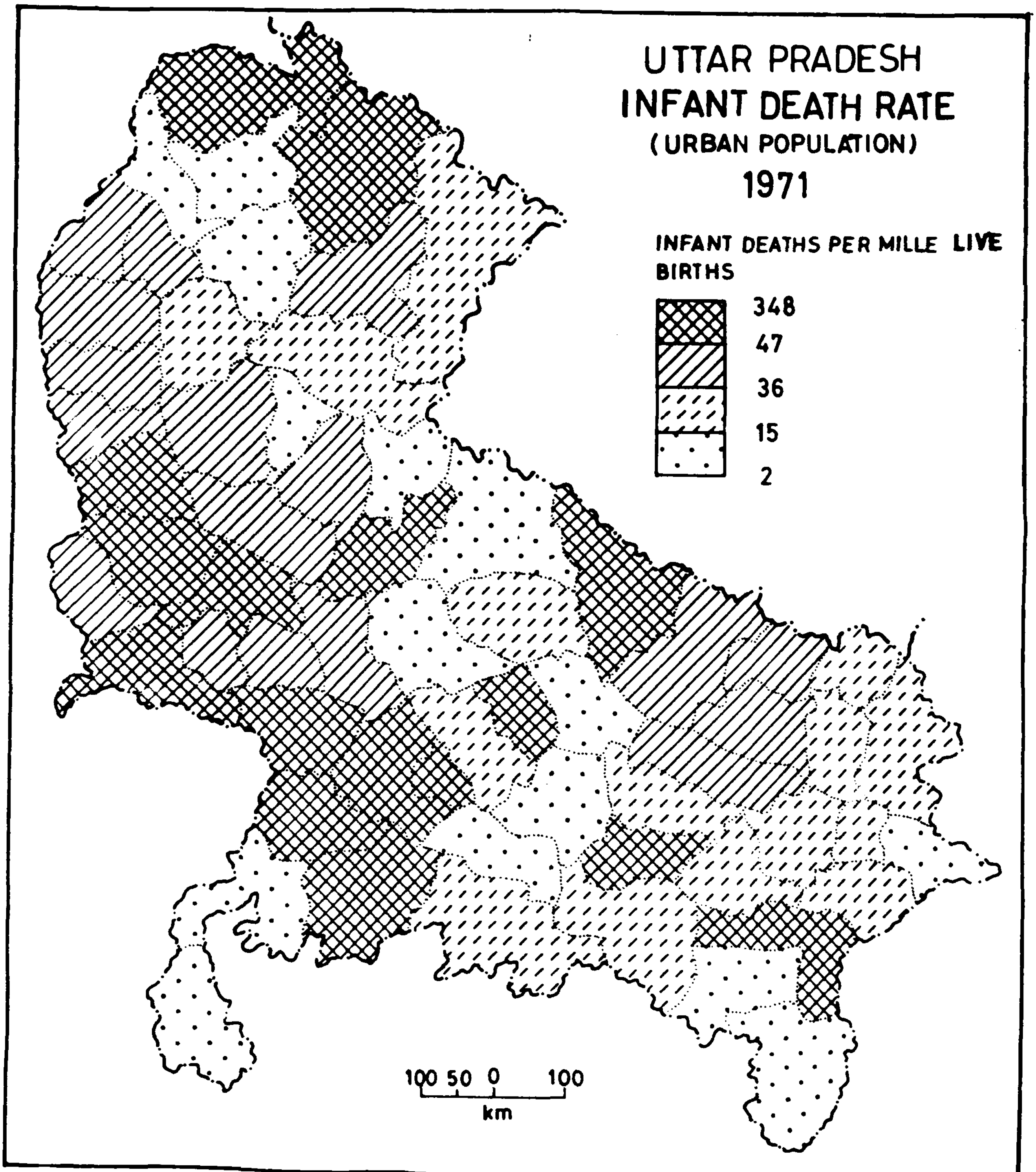

UTTAR PRADESH
INFANT DEATH RATE
(URBAN POPULATION)
1971
INFANT DEATHS PER MILLE LIVE BIRTHS
348
47
36
15
2
100 50 0 100
km

FIG.68

Two-thirds of the western district form a distinct continuous region of median to high grade of infant death rates of urban areas. These districts against their urban infant death rates, in descending order, are Budaun (45), Moradabad (43), Ghaziabad (43), Meerut (43), Saharanpur (41), Hardwar (41), Muzaffarnagar (40), Firozabad (39), Mainpuri (39), Farrukhabad (37) and Bareilly (36). A distinct but small region of the same slab comprised of four districts - Gonda (43), Siddharthnagar (40), Basti (40) and Faizabad (36), is found in the northeastern part. It may be noted that a dominant region of urban infant death rates of median to low slab is found in the eastern part of the state. Three districts of the similar grade form an identifiable region in the northern part to include Bijnor (35), Nainital (29) and Pithoragarh (35). Three small regions each comprised of three districts of low to very low (15 - 2) urban infant death rates are found : one lies in the Himalayan zone and include Dehradun (11) Tehri Garhwal (12) and Garhwal (11) districts, second is found almost in eastern part of the west plain and comprises Hardoi (8), Kheri (9) and Pilibhit (5) districts and third in the central plain composed of the districts of Fatehpur (9), Rae Bareli (3) and Barabanki (14). Remaining districts of Rampur (2), Jhansi (14), Lalitpur (14), Ballia (4), Mirzapur and Sonbhadra (5) are too scattered to delimit any identifiable region.

Infant death rates are more deficient in respect of rural areas. The extent of deficiency in registration of infant deaths is more than what appears from the rates, as these rates are worked out in relation to the number of registered births which is also deficient.[15]

Infant Death Rate 1980

General Distribution

There is a continuous decline in infant death rates among the districts. The state average is found to be 17.86 infant deaths per mille live births in 1980 which is 25.92 points less over the year 1971. It is marked with relatively narrow but notable variations among the districts, it varies from 1 infant death per mille live births in Ghazipur to 48 per mille in Varanasi in 1980. It may be seen that about seventy per cent districts record infant death rates less than 25. Fig.69 shows that two-thirds districts of high to very high infant deaths of 27 to 48 per mille live births constitute a dominant region in the central part of the state and the remaining districts are scattered over eastern and western plain. Half of the districts of median to high slab lies in the east and half in the west of the above noted region. Six districts in the western part constitute two regions of equal size, one comprised of Agra (16), Etah (13) and Budaun (16) and other

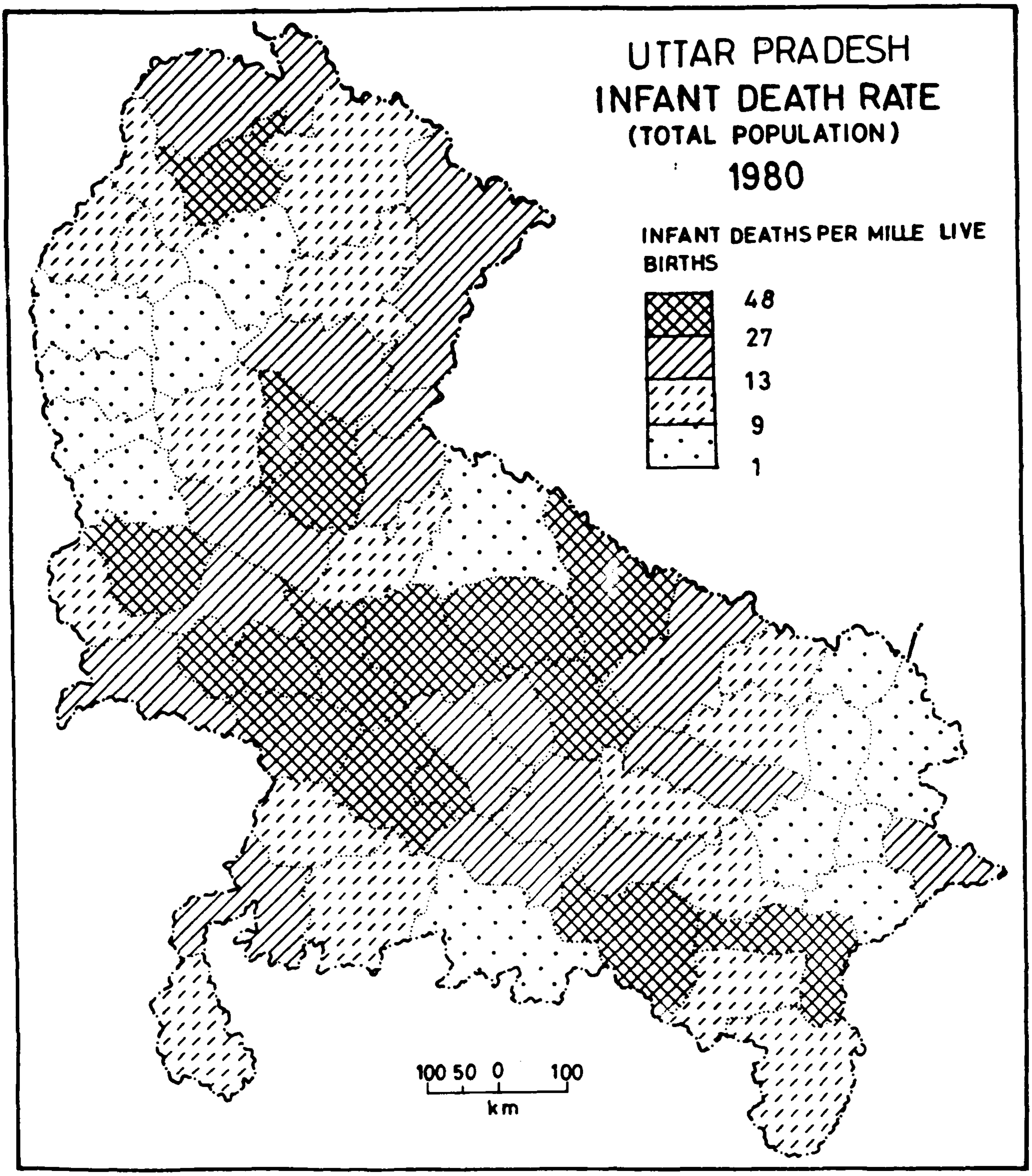

UTTAR PRADESH
INFANT DEATH RATE
(TOTAL POPULATION)
1980
INFANT DEATHS PER MILLE LIVE BIRTHS
48
27
13
9
1
100 50 0 100
km

FIG-69

comprised of Pilibhit (15), Nainital (20) and Pithoragarh (15). The other, i.e., in eastern part discontinuously includes seven districts of Unnao (16), Lucknow (19), Rae Bareli (23), Fatehpur (20), Pratapgarh (16), Faizabad (17) and Gonda (17). The districts of median to low slab (13-9) are scattered over the state, they do not constitute any notable region. But the two distinct regions of low to very low (9-1) infant death rates are identified - one in the extreme eastern part and the other in the northwestern part. Former comprises six districts of Maharajganj (8), Gorakhpur (8), Deoria (7), Mau (8), Azamgarh (8) and Ghazipur (1). The latter includes the districts of Bulandshahr (3), Ghaziabad (6), Meerut (6), Muzaffarnagar (8), Bijnor (6) and Garhwal (4). It may be pointed out that low infant death rates indicate the omission of more infant deaths from registration records.[16]

Rural/Urban Distribution

The infant death rate of the rural population tends to decline from 42.22 in 1971 to 16.64 in 1980 which records a difference of 25.58 points. The rate of decline for the urban population is found to be relatively low, i.e., 14.37 points. Though the pattern of regional distribution of infant death rates of rural area is very much similar to that of the total population, it is, however, considerably different from that of the urban population. Fig.70 shows that the central part of the state is characterized by high to very high rates of infant deaths in rural areas. It comprises about more than two-thirds districts. Three Himalayan districts - Uttar Kashi (20), Tehri Garhwal (30) and Dehradun (21) form a small region. Two-thirds districts of median to high infant death rates form three small regions in central, southeastern and northern part of the state. First comprises four districts of Kanpur Nagar (17), Kanpur Dehat (17), Unnao (17) and Rae Bareli (18), second includes Varanasi (18), Mirzapur (11) and Sonbhadra (11), and the third comprises two Himalayan districts (Pithoragarh and Nainital) and one west plain district of Pilibhit. The districts lying below median values of the two grades form two distinct regions. One region, i.e., of median to low slab is found in the northeastern part, it comprises the districts of Basti, Siddharthnagar, Maharajganj, Gorakhpur, Deoria, Ballia, Mau and Azamgarh. The other dominant region of low to very low infant death rates (6-1) in rural areas covers about half of the northern districts of west plain and Garhwal - a district of the Himalayan zone (Fig.70).

Among the districts the urban infant death rates vary within the range of 4 to 128 infant deaths per mille live births. Unnao having the minimum and Bareilly the maximum followed by Bahraich (98) which is far below. The

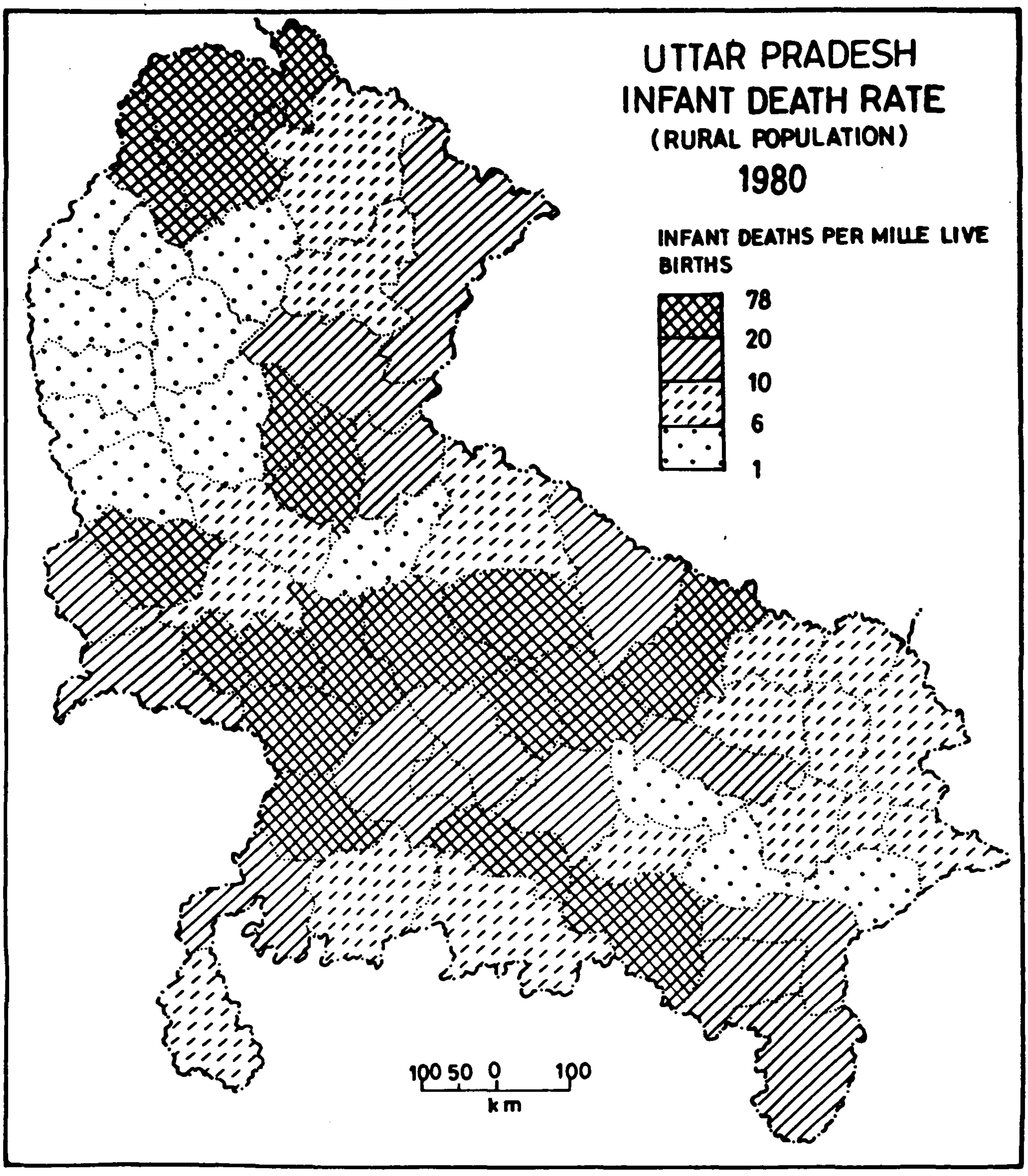

UTTAR PRADESH
INFANT DEATH RATE
(RURAL POPULATION)
1980
INFANT DEATHS PER MILLE LIVE BIRTHS
78
20
10
6
1
100 50 0 100
km

FIG.70

range of variations is considerably large and the graded distribution of infant death rates of urban population(Fig.71). Figure 71 shows that districts of 37 to 128 urban infant death rates constitute three small regions. Two of them are relatively prominent in southwestern and eastern half of the state. Former comprises Etawah, Kanpur Nagar, Kanpur Dehat, Jalaun and Hamirpur districts. The latter includes Rae Bareli, Sultanpur, Jaunpur and Varanasi districts. Three western districts of Shahjahanpur, Bareilly and Budaun also form a tiny region of high to very high rates of infant deaths. These three regions are interrupted by the districts of below median grade of infant death rate. Median to high infant death rate (24-37) districts are scattered over the state, but the majority of the districts are concentrated in the western half. Two Himalayan districts (Almora and Nainital) and two west plain districts (Moradabad and Ghaziabad) form a distinct region, the other is found immediately in the south of this region, separated by two districts - one of high slab and the other of relatively low slab. A discontinuous region of this grade is found in the northern part of the central and eastern plains. It includes the districts of Sitapur, Lucknow, Gonda, Gorakhpur and Maharajganj. Two regions of median to low grade of (24-15) infant death rates are found in the

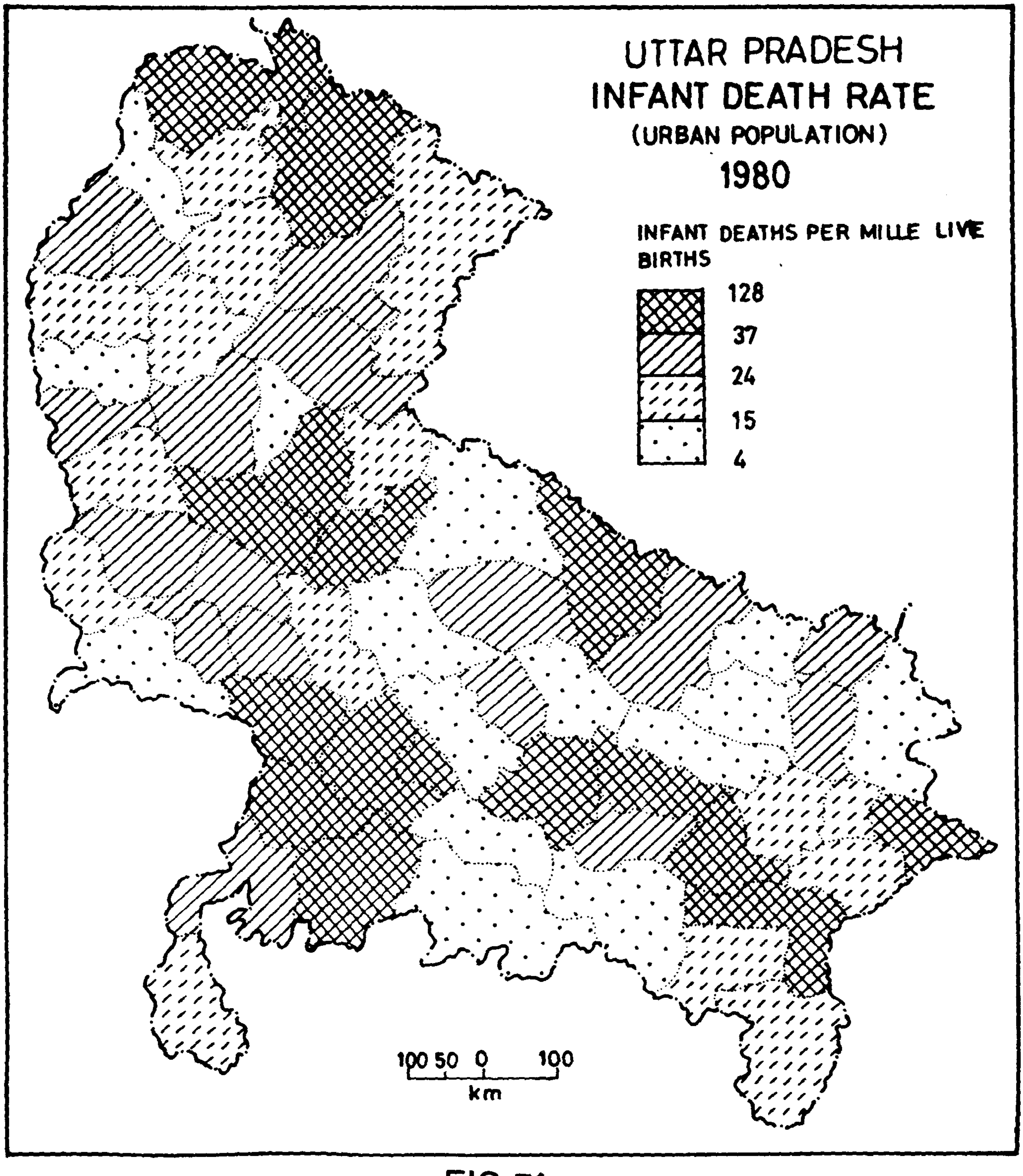

UTTAR PRADESH
INFANT DEATH RATE
(URBAN POPULATION)
1980
INFANT DEATHS PER MILLE LIVE BIRTHS
128
37
24
15
4
100 50 0 100
km

FIG.71

state : one in the northwestern part and the other, which is discontinuous, in the eastern part. With the exception of few districts, all the districts of low to very low slab are closer to each other mainly in the eastern half of the state where they constitute a discontinuous region. This region runs from Banda in the south to Kheri in the north, Basti and Deoria in the east. This distribution does not depict any uniform pattern.

It may be highlighted that the infant death rates are more deficient in respect to rural areas. The extent of deficiency in registration of infant deaths is even more than that what appears from the rates.[17] This is because these rates are worked out in relation to the number of registered births which are themselves deficient.[18]

While estimating the infant death rates in Bihar, it has been obserbed that most of the areas of the North Bihar which are primarily agricultural tracts have low infant death rates. This was felt to be rather surprising because of socio-economic backwardness of the region. It is now observed that the areas of eastern Uttar Pradesh which are also backward from the socio-economic point of view and which are akin to North Bihar in their socio-economic setting are also having low infant death rates. The regions for comparatively low infant death rate in these economically backward districts which are predominantly agricultural in both eastern Uttar Pradesh and North Bihar need to be probed deeply.[19]

Infant Death Rate 1990

General Distribution

The number of infant deaths per mille live births tends to decline further but the rate of decline is low from 1980 to 1990 with a deviation of 3.05 points. The range of variations of infant death rates among the districts is also low with the exception of Gonda (49.06), Mainpuri (55.11) and Firozabad (60.00) which record infant death rates far above the average and even upper quartile value of 19.04 (Table 14). The districtwise distribution shows that the majority of the districts of central and western plains and the Himalayan zone have the infant death rates above the median and moreover, they combinedly constitute a prominent discontinuous region of high to very high grade in the western half of the state. It may be pointed out that the discontinuity is maintained by the patches of median to high grade of infant death rates (Fig.72). Nine districts of median to high grade are discontinuously and diagonally distributed. However, they form three distinct regions each comprised of three districts in eastern part of west plain, central part and southeastern part of the state, First

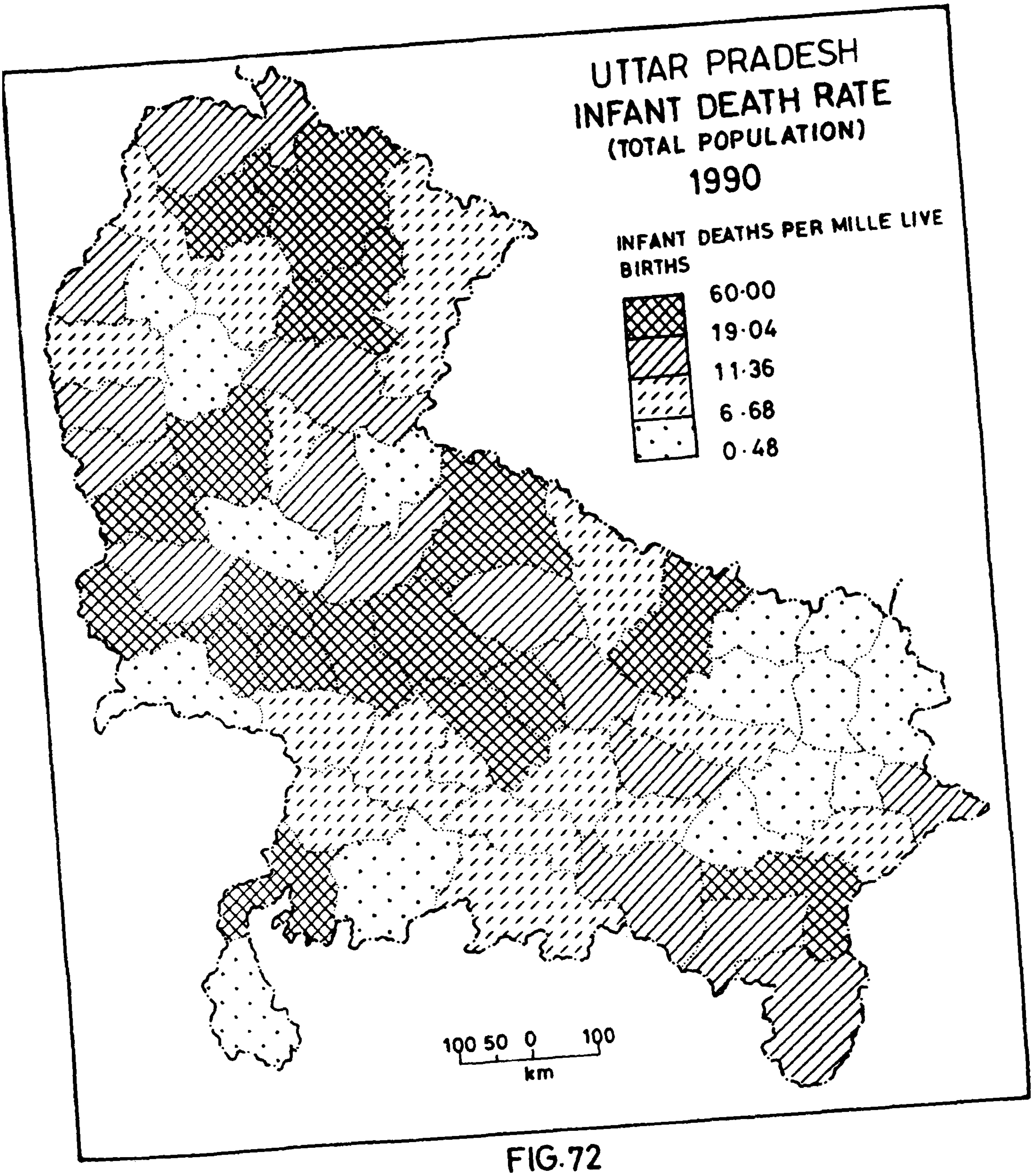

UTTAR PRADESH
INFANT DEATH RATE
(TOTAL POPULATION)
1990
INFANT DEATHS PER MILLE LIVE BIRTHS
60·00
19·04
11·36
6·68
0·48
100 50 0 100
km

FIG.72

comprises three districts of Nainital (15.47), Bareilly (12.55) and Shahjahanpur (16.90), second includes Sitapur (15.79), Barabanki (14.71) and Sultanpur (11.40), and the third region is composed of Allahabad (16.27), Mirzapur (17.17) and Sonbhadra (18.00). One Himalayan district of Uttar Kashi (17.14) and one eastern plain district of Ballia (11.40), and three western plain districts of Saharanpur (15.45) Meerut (11.36) and Ghaziabad (16.36) are far apart therefore, they do not form any region of this similar grade. The overwhelming majority of southern and eastern districts fall below median grade of infant death rates. They combinedly form two prominent regions: one, of median to low grade is found in the central - southern part of the state, and comprises the districts of Etawah (6.68), Jalaun (11.07), Kanpur Dehat (10.95), Kanpur Nagar (10.00), Banda (8.28), Fatehpur (6.68), Rae Bareli (8.52) and Pratapgarh (9.70). The other lying between low to very low grade of infant death rates (6.68 - 0.48) forms a region in the eastern part and comprises about two-thirds districts of this grade. These districts are Basti (2.08), Siddharthnagar (2.25) Maharajganj (3.00), Gorakhpur (2.98), Deoria (5.90), Mau (4.50), Azamgarh (3.40) and Jaunpur (2.62). Small patches of below median slabs are found in the northwestern part to include some western plain districts and the Himalayan districts. Remaining districts of these slabs are scattered over the state.

Rural/Urban Distribution

Infant death rate in rural population of the state is 15.64 which is less than half of urban (34.34). In rural areas, it ranges from 0.09 infant deaths per mille live births in Ballia to 83.39 in Farrukhabad, whereas in urban areas it varies widely from 0.05 in Aligarh to 186 in Uttar Kashi. Table 14 shows that about seventy-five per cent of the districts record the rural infant death rates below 20 and urban infant death rates below 46. It indicates that very sharp increase in infant death rates is found among few districts which aid to maximum increase in the state average. Fig.73 depicts that the majority of central and west plain districts and about half of the Himalayan districts record the rural infant death rates above the median. Seven districts of Mathura (35.71), Etah (35.13), Firozabad (60.52), Mainpuri (51.41), Farrukhabad (83.39), Hardoi (31.92) and Unnao (29.80) constitute a distinct region of high to very high grade in the central western part of the state. Two small regions of this slab, each composed of three districts are found in the western and southeastern part of the state - former includes Meerut (33.52), Ghaziabad (21.62) and Moradabad (33.89) and the latter comprises Varanasi (37.36), Mirzapur (20.99) and

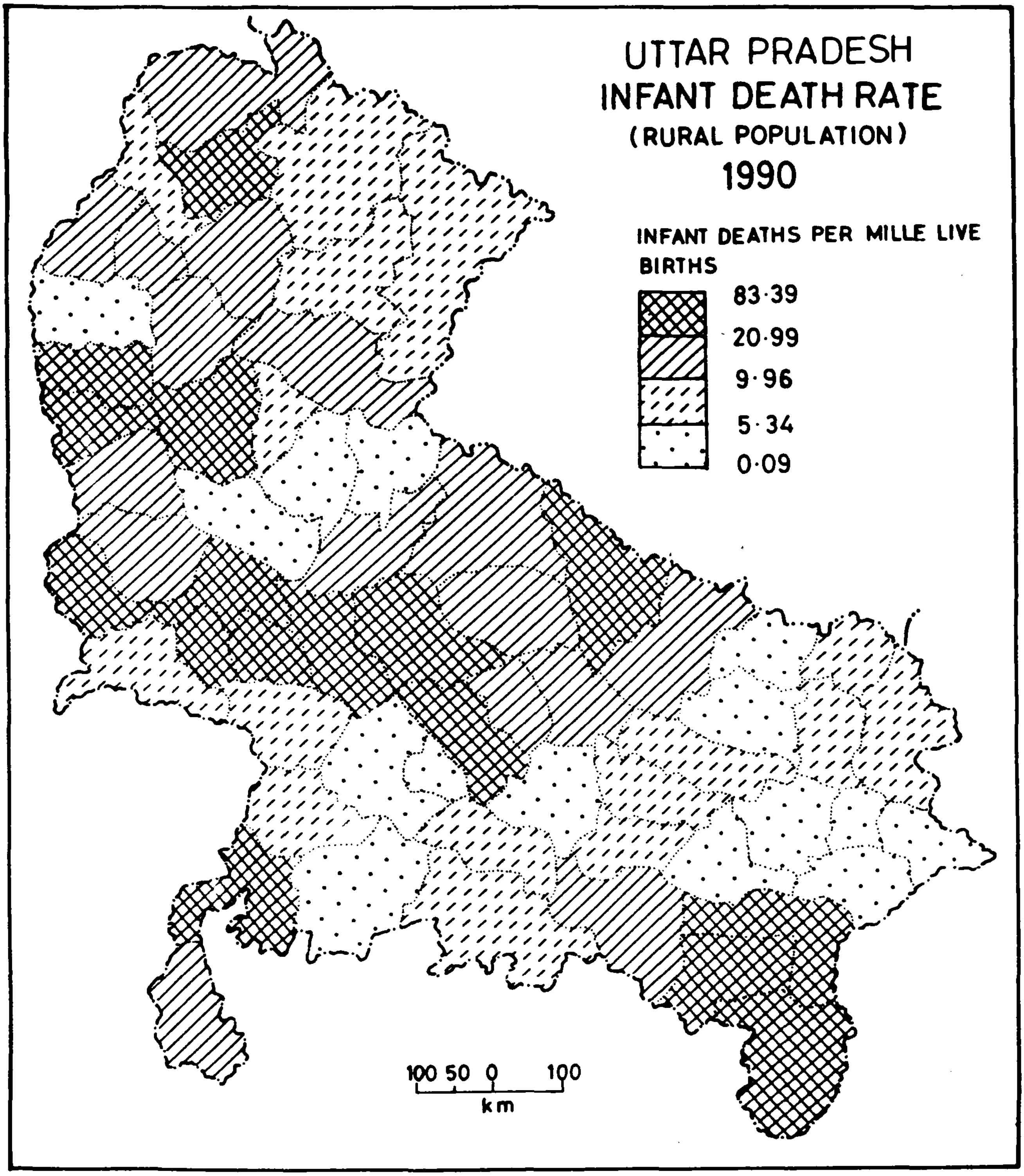

UTTAR PRADESH
INFANT DEATH RATE
(RURAL POPULATION)
1990
INFANT DEATHS PER MILLE LIVE BIRTHS
83·39
20·99
9·96
5·34
0·09
100 50 0 100
km

FIG.73

Sonbhadra (21.50). Two identifiable zone of median to high (9.95 - 20.99) rural infant death rates are found in the state. One is composed of the majority of the districts of northern part of the plain, they against their infant death rates are Shahjahanpur (15.80), Kheri (17.40), Sitapur (15.42), Lucknow (13.19), Barabanki (15.30) and Gonda (16.50). Second lies in the northwestern part to include five districts of Saharanpur (10.10), Hardwar (12.00), Bijnor (12.00), Nainital (15.24) and Garhwal (9.96). Remaining districts are far apart therefore, they do not form any identifiable region. The median to low rural infant death rate is found in sixteen districts, fourteen of them form three regions. Eight of them comprised of some of eastern plain and central plain districts and a plateau district (Banda) form a prominent region in the eastern half of the state. Three districts of Agra, Etawah and Jalaun form a small region in southwestern part and the three Himalayan districts of Chamoli (9.86), Pithoragarh (6.47) and Almora (6.96) constitute a region in the northern part of the state. A big discontinuous region of low to very low slab of rural infant death rates is identified in the eastern part to include the districts of Siddharthnagar (2.45), Basti (2.24), Azamgarh (5.15), Mau (5.20), Ballia (0.09), Ghazipur (0.85) and Jaunpur (2.58). Two small regions of this slab are far apart : one lies in the southern part which comprises Kanpur Nagar, Kanpur Dehat and Hamirpur districts and the other in the western part to include Pilibhit, Bareilly and Budaun districts. Muzaffarnagar (3.95) and Rae Bareli (3.77) districts are away from themselves and from other regions therefore, they do not constitute any recognizable region.

The ~~un~~uniform pattern of distribution of infant death rates in the urban population of the districts in 1990 is observed. There has been a shift of regions of above median grade of infant death rates towards east and south as compared to the rural infant death rates as shown in Fig.74. The range of variations in the four grades of the infant deaths is very wide above the median slab, whereas below the range is about 10 to 13 points. Fig. 74 depicts that a narrow belt of high to very high grade includes the southern districts of west and central plains and runs from Agra (51.38) in the west to Allahabad (45.56) in the southeast. The some other districts form an interrupted region in the northern part and includes Uttar Kashi (186.00), Tehri Garhwal (45.92) and Almora (83.56) districts of the Himalayan zone and Saharanpur (57.22) of the west plain. Under the median to high grade of urban infant death rates eastern districts of west plain and northern districts of central and eastern plains lie which constitute two distinct regions : one comprises nine districts of Kheri (25.72),

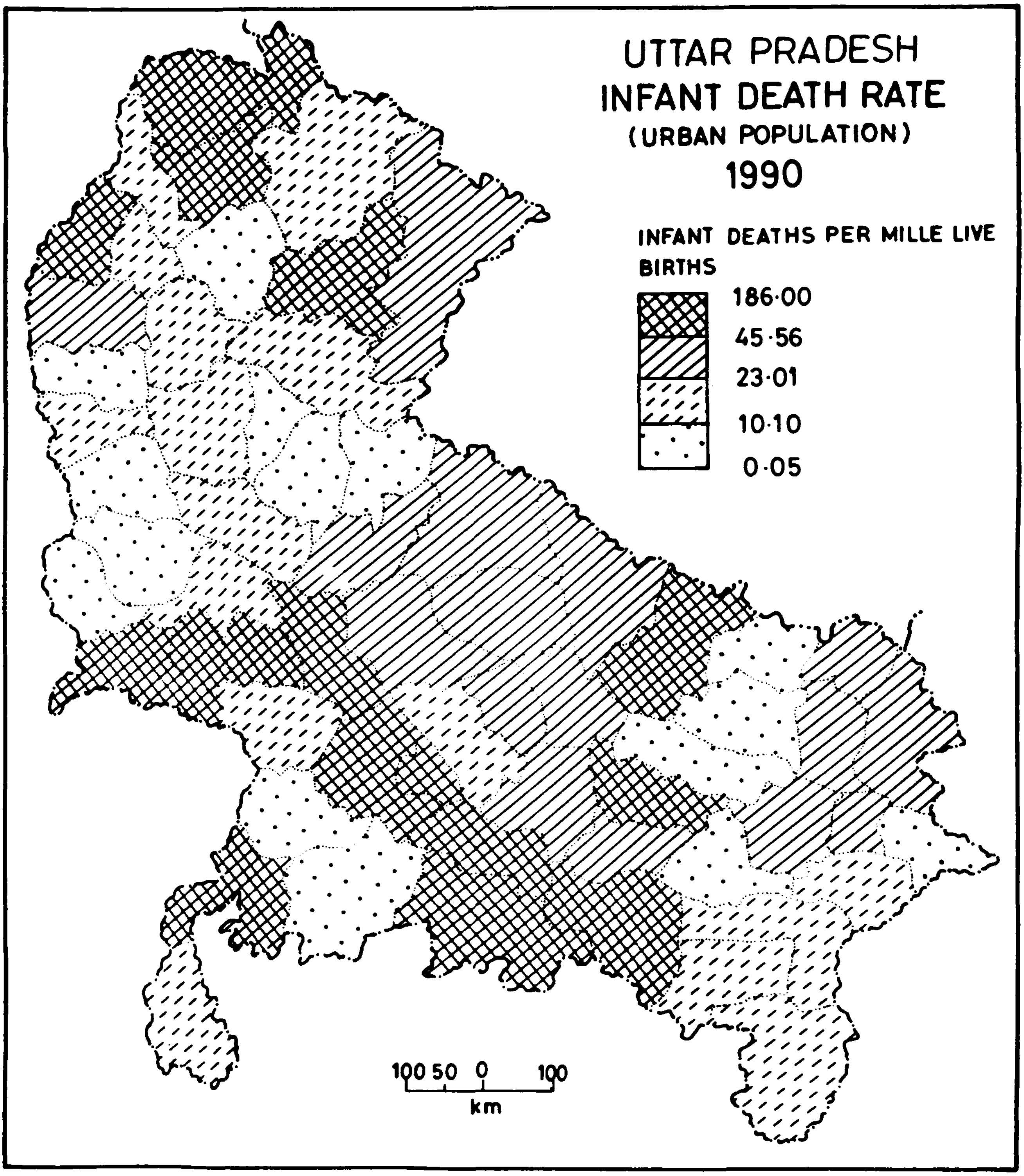

UTTAR PRADESH
INFANT DEATH RATE
(URBAN POPULATION)
1990
INFANT DEATHS PER MILLE LIVE BIRTHS
186·00
45·56
23·01
10·10
0·05
100 50 0 100
km

FIG. 74

Shahjahanpur (41.53), Hardoi (23.53), Sitapur (34.25), Bahraich (45.45), Barabanki (43.69), Lucknow (24.28), Rae Bareli (29.15) and Pratapgarh (31.76), and the other region is composed of five districts of Maharajganj (43.60), Gorakhpur (43.53) Deoria (45.00), Mau (23.45) and Azamgarh (23.01). Some of the southeastern districts and north-western districts constitute two small regions of median to low slab. One includes more than half of the districts and forms a narrow vertical belt stretching from Dehradun in the north to Etah in the south. Second region is about half of the first one and comprises four southeastern districts of Sonbhadra (17.82), Mirzapur (17.78), Varanasi (18.99) and Ghazipur (12.83). About half of the districts of low to very low grade lies in the western part and the remaining districts are distributed in other parts. However, two distinct but small regions of this slab lie in the western part each comprised of three districts. These two regions are interrupted by a district (Budaun) of relatively high urban infant death rate as shown in Fig.74. Third region of the same size lies in the eastern part and comprises Siddharthnagar (3.25), Basti (3.22) and Faizabad (9.40) districts.

A significant point to note is that while the infant death rates in urban areas of the districts are generally lower than these in the rural areas, but in this study, here is a inverse shape of the distribution in rural and urban areas, because the study is based upon the registered data. However, community environment can influence infant death can be seen in the increase in the urban death rate. Overcrowding, lack of sanitation and a resulting increase in communicable diseases are being cited as the chief reasons for the increase.[20]

MORTALITY REGION

Here two sets of mortality regions - death rate and infant death rate are identified. They are based upon the ranking where districts of the state are ranked according to their levels of death rate and infant death rate for the year 1961, 1971, 1981 and 1990. The rank of each district of four decadal years are added. The districtwise composite rankings so obtained indicate that higher the value higher is the concentration of mortality rate (death rate and infant death rate) and vice-versa.

Death Rate Region (1961-90)

Fig.75 shows that four levels for death rate regions are identified. The regions of relatively high to very high index (164.0 - 219.5 composite rankings) form two distinct regions . One lies in the Himalayan section and comprises the districts of Uttar Kashi (189.0), Chamoli (196.5), Almora (177.0) and Garhwal (219.5). Second lies in the west plain

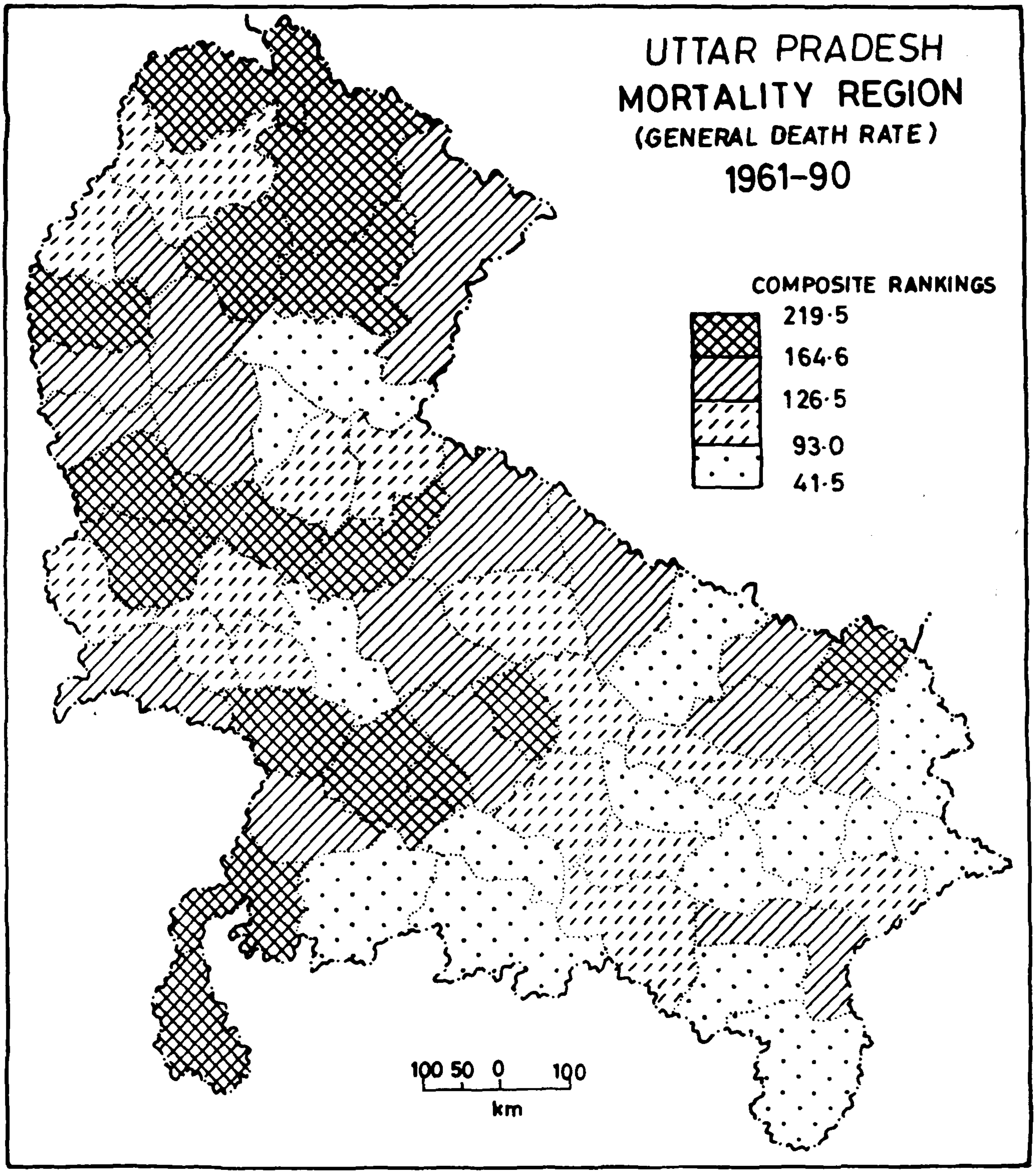

UTTAR PRADESH
MORTALITY REGION
(GENERAL DEATH RATE)
1961–90
COMPOSITE RANKINGS
219·5
164·6
126·5
93·0
41·5
100 50 0 100
km

FIG.75

and includes the districts of Shahjahanpur (205.0), Budaun (177.0), Aligarh (175.0) and Bulandshahr (213.5). Remaining two small regions interrupted by Jalaun are located in southwestern part. It includes the districts of Etawah, Kanpur Dehat, Kanpur Nagar, Jhansi and Lalitpur. Median to high composite rankings (126.5 - 164.0) districts are uniformly distributed over the state, however, about seventy-five per cent districts form three distinct regions. One lies in the western plain and comprises Hardwar, Bijnor, Moradabad, Ghaziabad and Meerut districts in northcentral part of the plain to includes the districts of Kheri, Bahraich, Hardoi and Unnao and third in north-eastern part to comprise Siddharthnagar, Basti and Gorakhpur districts. Median to low index (126.5 - 93.0 composite rankings) districts form a big well marked region in the central part which includes the districts of Sitapur, Barabanki, Faizabad, Rae Bareli, Fatehpur and Allahabad. Two other small regions of the same slab of composite rankings are observed : one in northwestern part, other in southern part of west plain. The former is composed of Tehri Garhwal, Dehradun and Saharanpur and the latter is constituted by Mathura, Etah, Firozabad and Mainpuri. Under low to very low index (93.0 - 41.5 composite rankings) one discontinuous region interrupted by Allahabad district is located in the southern and eastern parts of the state (Fig.75).

In rural population the index (composite rankings) varies very widely from a minimum of 40.0 in Ballia to maximum of 233.0 in Garhwal. The regional distribution is fairly well marked and the regions defined by the quartiles of 40.0 to 98.0, 98.0 to 123.0, 123.0 to 156.5 and 156.5 to 233.0 composite rankings are identified in the state (Fig.76). Under high to very high index (156.5 - 233.0 composite rankings) three distinct regions form. One lies in the northern part of the state and comprises the five Himalayan districts of Uttar Kashi (189.0), Chamoli (206.0), Tehri Garhwal (186.0), Garhwal (233.0) and Pithoragarh (156.5). Second is found in the western part and includes the districts of Shahjahanpur (218.5), Budaun (197.5), Aligarh (208.0), Bulandshahr (228.0) and Ghaziabad (173.5), and the third, i.e., relatively small in size is found in the northeastern part to include Siddharthnagar, Basti, Gorakhpur and Maharajganj districts with composite rankings of 166.5, 166.5, 167.5 and 168.5 respectively. Under median to high index (123.0 - 156.5 composite rankings) single discontinuous region interrupted by Shahjahanpur and Budaun districts is located from Bijnor in northwestern part to Pratapgarh in the central part. Fig.76 shows that relatively the districts of low to median index (98.0 - 123.0 composite rankings) demarcate the prominent region interrupted by Etawah district which runs from Mathura in

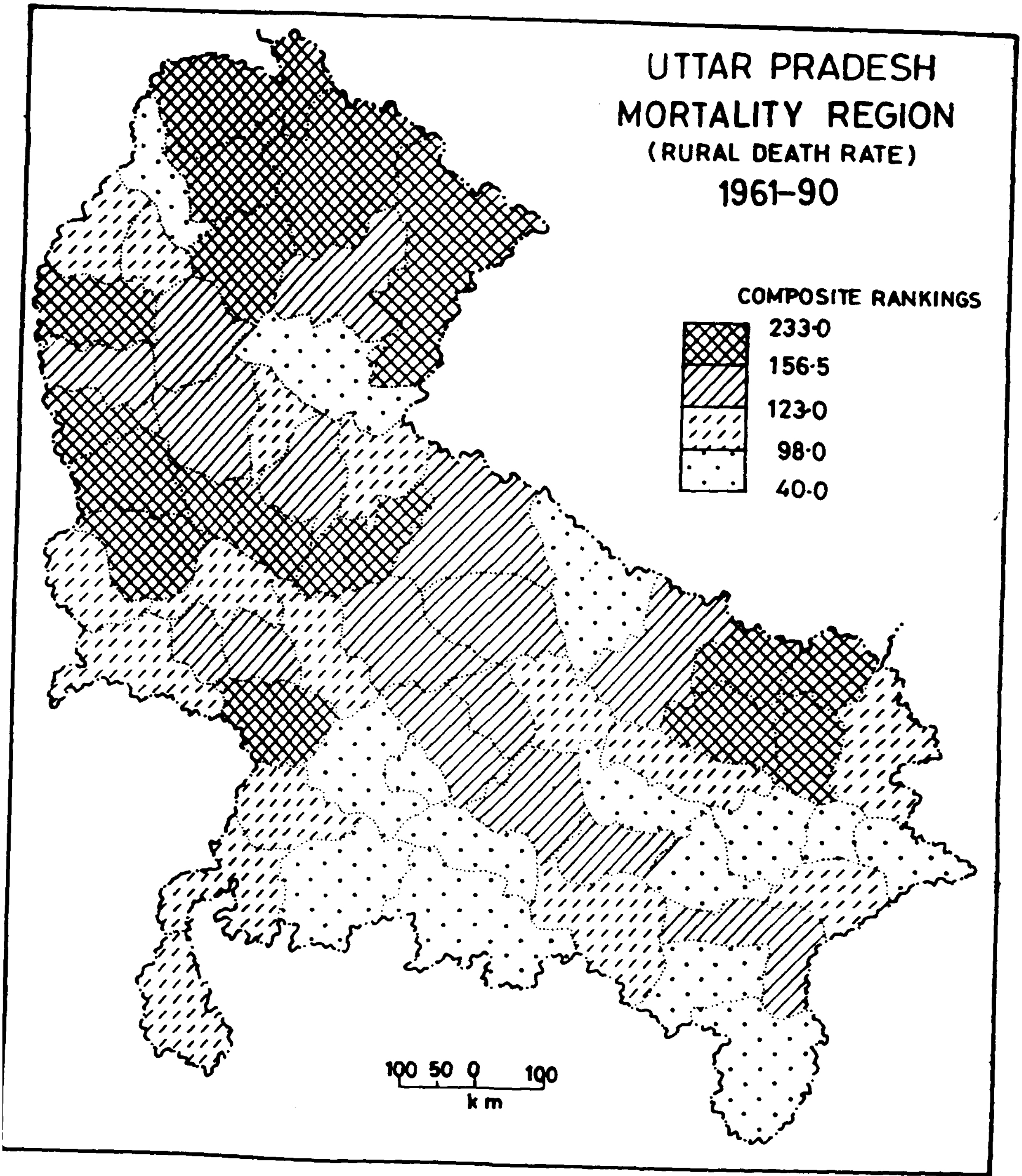

UTTAR PRADESH
MORTALITY REGION
(RURAL DEATH RATE)
1961-90
COMPOSITE RANKINGS
233·0
156·5
123·0
98·0
40·0
100 50 0 100
km

FIG.76

western part to Lalitpur in extreme southwest. Two regions of low to very low composite rankings (98.0 - 40.0) of almost equal size are found : one lies in the southern part and other in the eastern part of the state. The former is composed of the districts of Kanpur Nagar, Kanpur Dehat, Hamirpur, Fatehpur and Banda and the latter is constituted by Sultanpur, Jaunpur, Azamgarh, Mau and Ballia.

The urban death rate regions are identified in the state. They have slightly different levels of quartiles of composite rankings of the districts as compared to rural areas though the median of the districtwise composite rankings is the same (123.0). Fig.77 shows that a discontinuous region of high to very high index (165.5 - 230.0 composite rankings) is observed mainly in the eastern half of the state. This region is interrupted by a prominent region of low to very low composite rankings (93.0 - 35.0), which is comprised of some of the central and west plain districts and two plateau districts. The majority of the districts belonging to median to high composite rankings lie in the western half of the state. Some of them form two regions. One, i.e., relatively big in size comprises the districts of Uttar Kashi (143.5), Dehradun (141.0), Hardwar (155.0), Saharanpur (158.0) and Muzaffarnagar (163.5). Other, i.e., relatively small in size includes the districts of Pithoragarh (137.5),

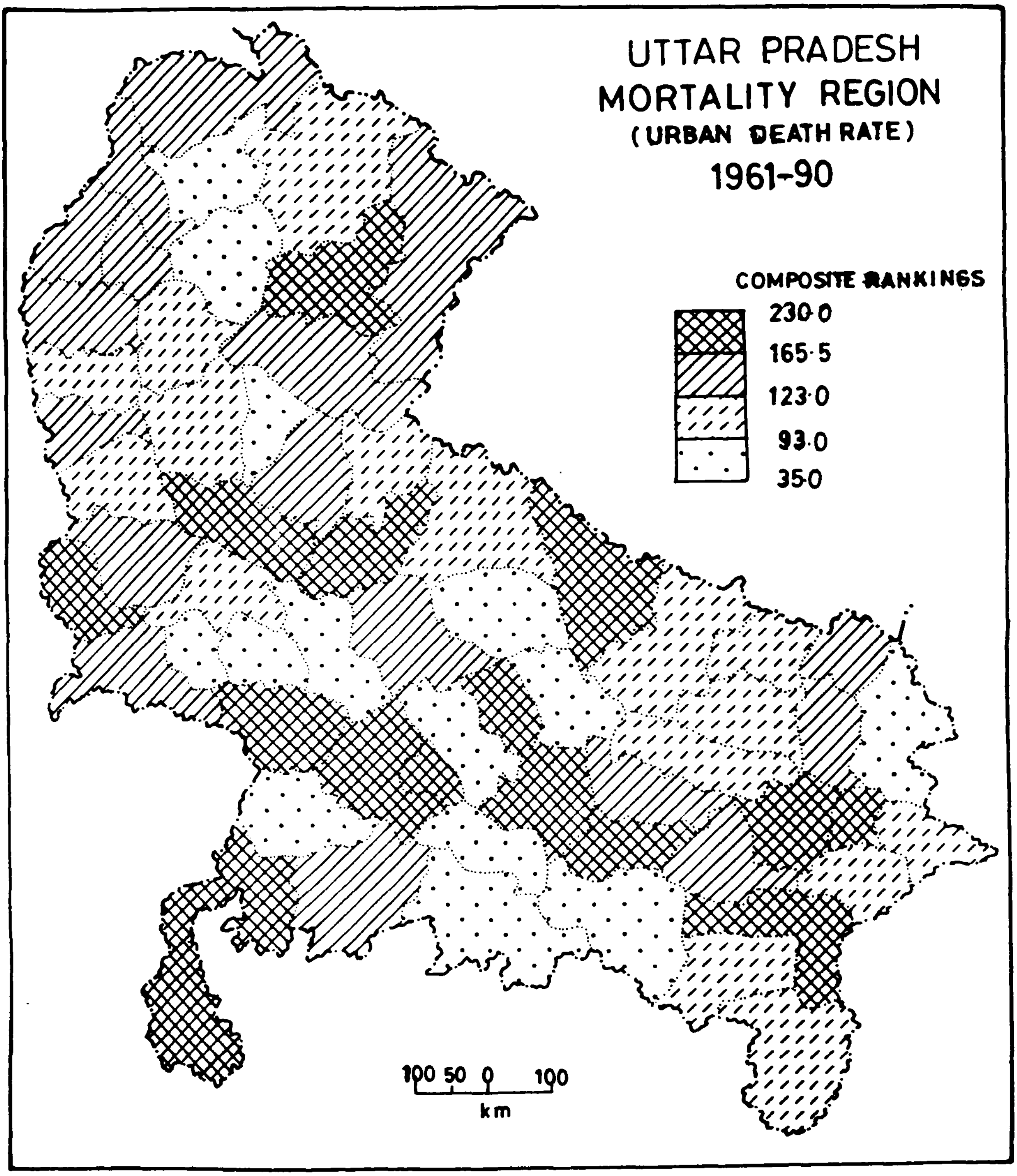

UTTAR PRADESH
MORTALITY REGION
(URBAN DEATH RATE)
1961-90
COMPOSITE RANKINGS
230·0
165·5
123·0
93·0
35·0
100 50 0 100
km

FIG.77

Nainital (123.0) and Bareilly (125.0). Rest of the districts of this slab are scattered over the state as shown in Fig.77. The districts of low to median index (93.0 - 123.0 composite rankings) are discontinuously distributed over the western, northern, eastern and southeastern margins of the state and they constitute small regions. A narrow belt formed under low to very low index (93.0 - 35.0 composite rankings) runs from Firozabad in west to Allahabad in southeast (Fig.77).

Infant Death Rate Region (1961-90)

The patterns of the infant death rate regions are depicted in Fig.78. The composite rankings of infant death rates are widely distributed among the districts of the state with a maximum of 223.0 in Hardoi and a minimum of 25.0 in Deoria. It corroborates that composite rankings obtained by these districts have been found to be uniform throughout the decadal years of composite rankings of the general population, may be arranged into quartiles of high to very high (163.5 - 223.0), median to high (123.5 - 163.5), median to low (123.5 - 95.0) and low to very low (95.0 - 25.0) composite rankings. The distribution of these graded rankings of infant death rate regions are shown in Fig.78. One compact distinct region of high to very high index which occupies about ninety-nine per cent districts in this grade

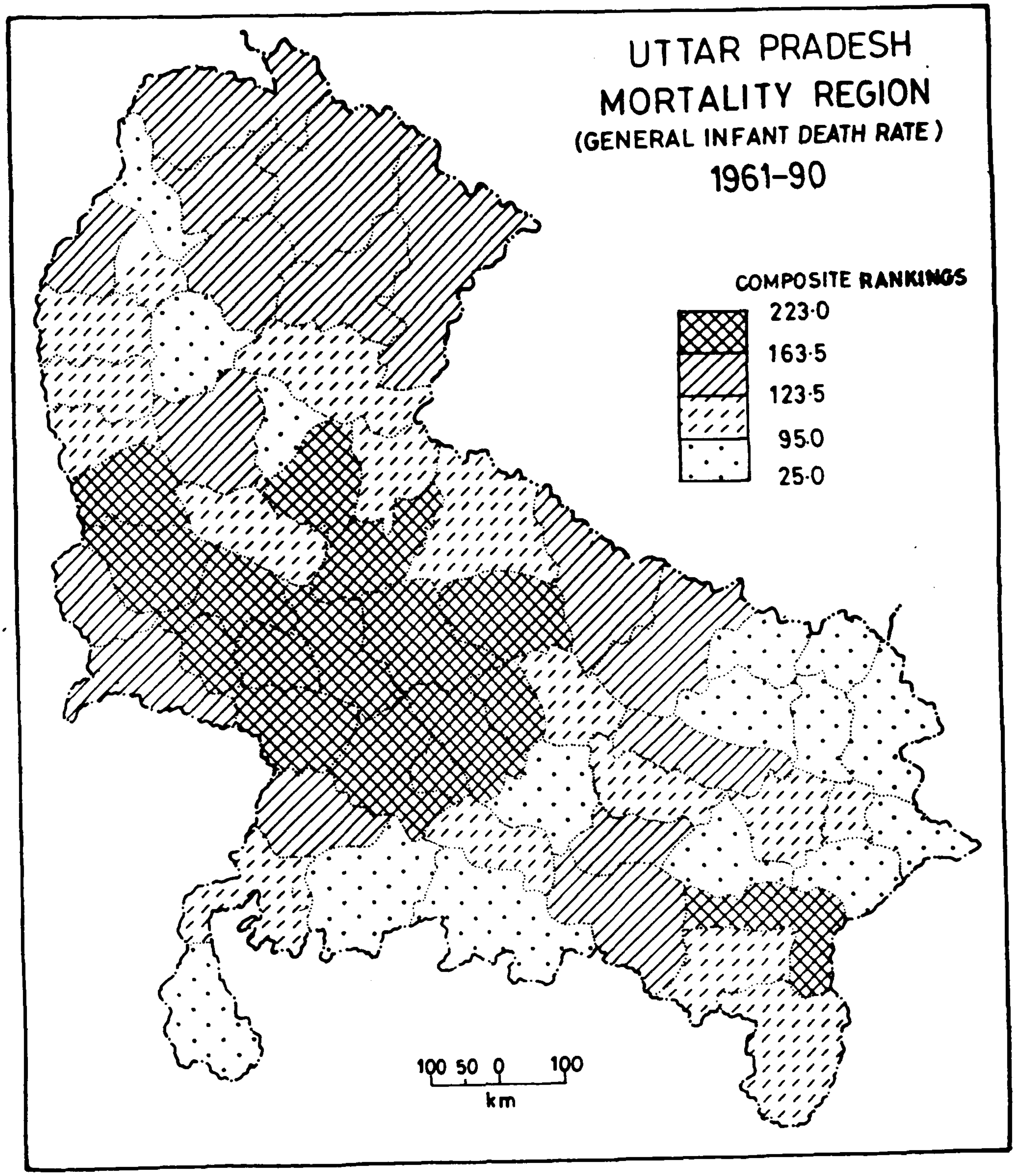

UTTAR PRADESH
MORTALITY REGION
(GENERAL INFANT DEATH RATE)
1961-90
COMPOSITE RANKINGS
223·0
163·5
123·5
95·0
25·0
100 50 0 100
km

FIG.78

lies in the central part of the plain. Two zones of median to high (123.5 - 163.5) slab are identified : one lies in the north to comprise six Himalayan districts of Uttar Kashi (140.5), Chamoli (151.5), Tehri Garhwal (129.0), Garhwal (132.5) Almora (142.5) and Pithoragarh (138.5). The second is located vertically in the eastern half of the eastern part of the state interrupted by Sultanpur - a district of below median slab. Three small regions of median to low index (123.5 - 95.0 composite rankings) are observed. One lies in the northwestern part to comprise four west plain districts of Hardwar, Muzaffarnagar, Meerut and Ghaziabad. Second is found in the east part of this plain to include Kheri, Pilibhit and Nainital. Third, i.e., a narrow belt, is located in the eastern half of the state. These three regions combinedly could be a single continuous region, but they are interrupted by Bijnor and Sitapur districts belonged to low to very low and high to very high grade respectively. Remaining districts of this rank are scattered over the state. Half of the districts of low to very low index form a prominent region in the eastern part of the state and comprises Siddharthnagar, Basti, Maharajganj, Gorakhpur, Deoria, Ballia, Ghazipur and Jaunpur districts. Rest of the districts of this slab are scattered mainly over western and southern parts of the state (Fig.78).

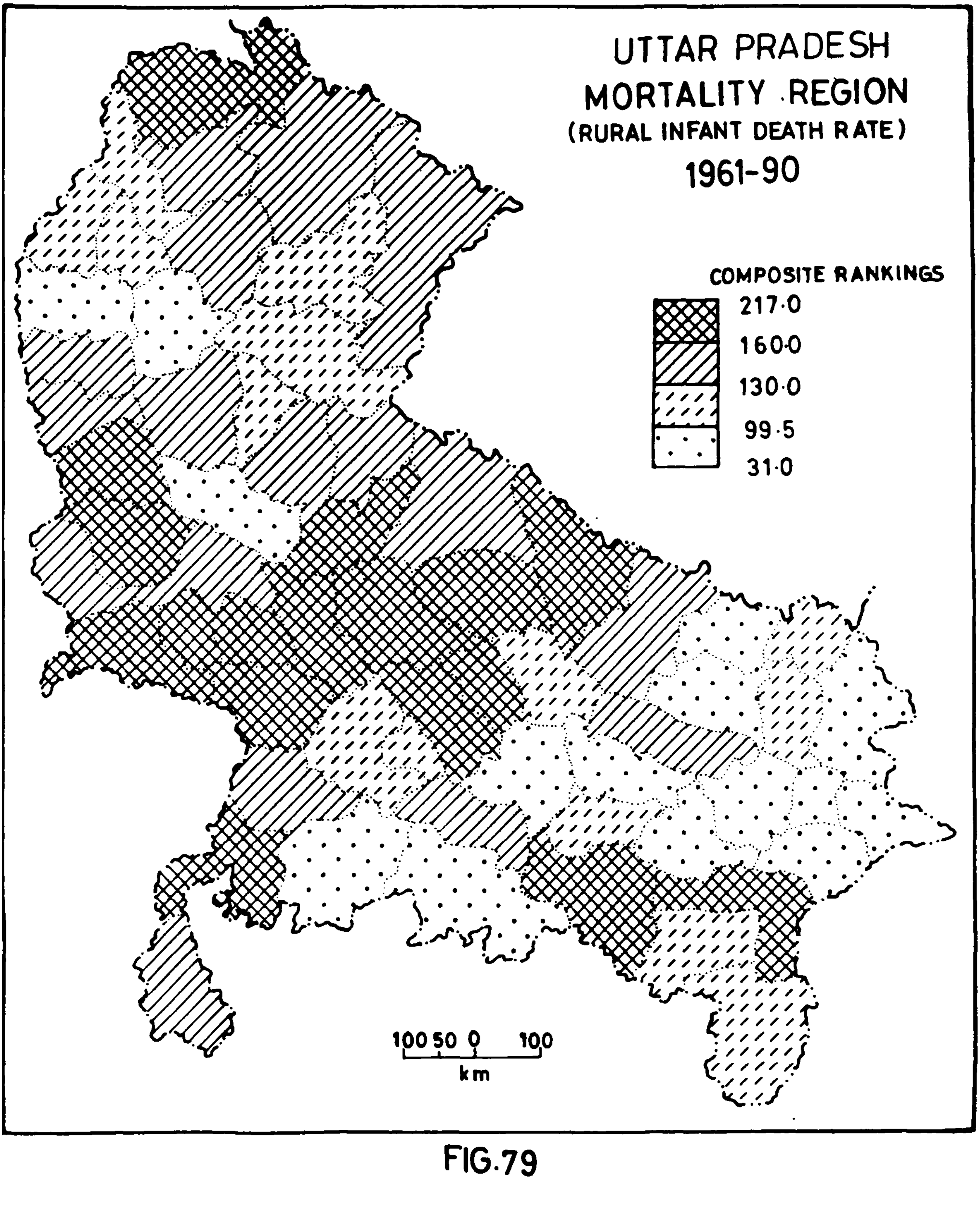

UTTAR PRADESH
MORTALITY REGION
(RURAL INFANT DEATH RATE)
1961-90
COMPOSITE RANKINGS
217·0
160·0
130·0
99·5
31·0
100 50 0 100
km

FIG.79

The identification of infant death rate regions in the rural population, with few exceptions, is similar to those of the general population. However, some interdistrict variations are observed. The majority of the districts of high to very high index form a continuous belt almost in the central part of the plain (Fig.79). In the immediate north of this belt a discontinuous zone of median to high index (130.0 - 160.0 composite rankings) is found. This discontinuity is developed by a region of median to low slab (130.0 - 99.5) which comprises Almora, Nainital, Rampur and Pilibhit districts. The other small region of the similar grade (130.0 - 99.5) is located in the northwestern part to comprise three districts of Dehradun, Saharanpur and Hardwar. About two-thirds districts of the bottom slab constitute a prominent region in the eastern half of the state to include central and east plain districts. Remaining districts are so scattered over the western and southern parts of the state that they fail to delimit any identifiable region.

The districtwise distribution of composite rankings of the urban infant death rate is relatively wide. it ranges from 15.5 to 235.5 with a minimum of 15.5 in Rampur and a maximum of 235.5 in Kanpur Dehat. The interdistrict distribution of composite rankings may be arranged into four index of very low to low, low to median, median to high and

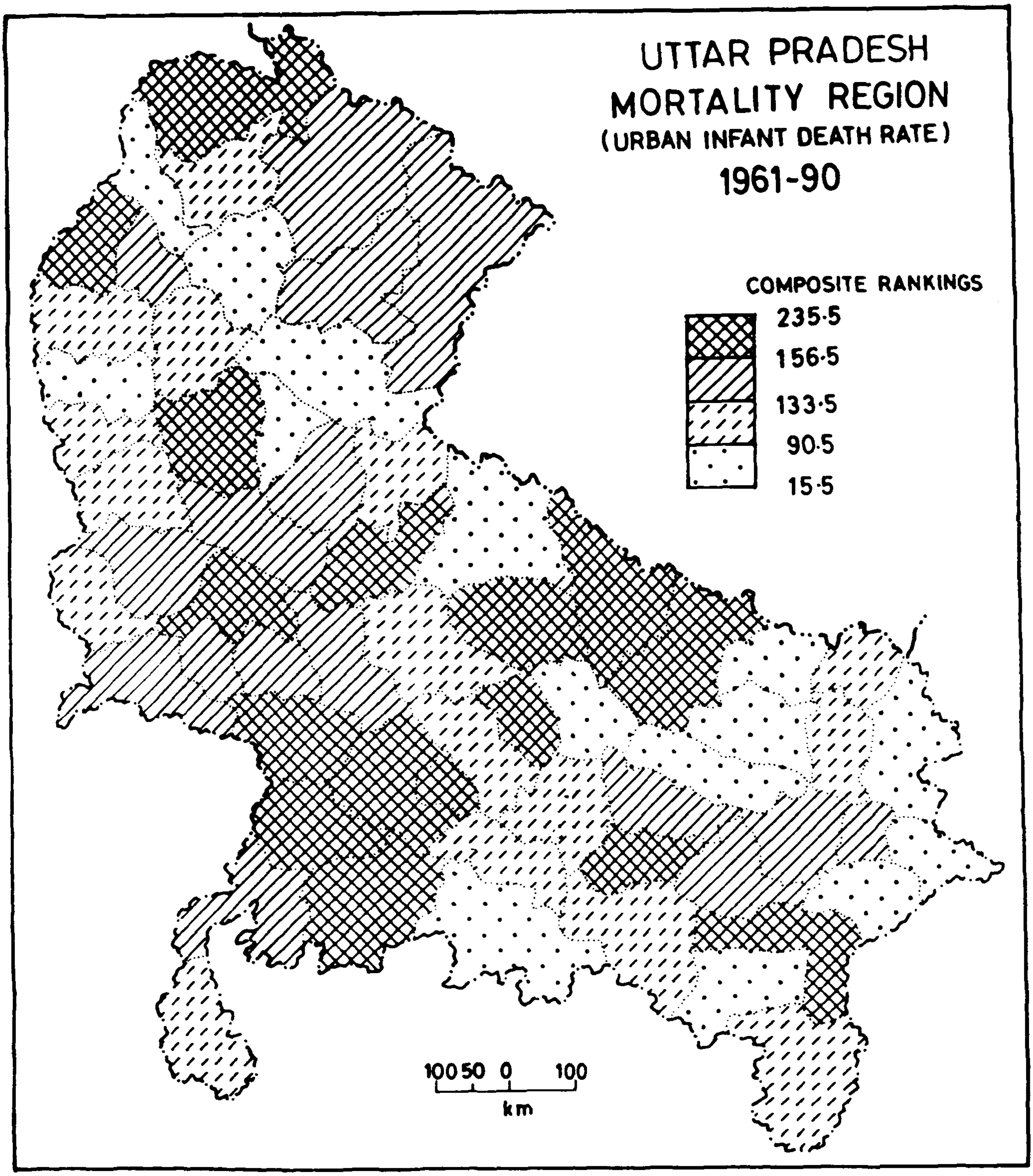

UTTAR PRADESH
MORTALITY REGION
(URBAN INFANT DEATH RATE)
1961-90
COMPOSITE RANKINGS
235·5
156·5
133·5
90·5
15·5
100 50 0 100
km

FIG. 80

high to very high, based on quartile techniques. Fig.80 shows that under the high to very high index, two regions of almost equal size are identified in the central part separated by a narrow continuous belt of median to low slab. Otherwise it could be combinedly a continuous compact zone of high to very high composite rankings. About half of the districts of this level are signally distributed over the state and they do not constitute any recognizable region. Three regions of median to high composite rankings are identified. One that comprises half of the districts of this slab, lies in the western part. Second is found in the eastern part to include four districts of Sultanpur, Jaunpur, Azamgarh and Mau. Third comprised of three districts of Chamoli, Pithoragarh and Almora is located in the extreme northern part. A narrow belt of median to low grade is diagonally distributed in the central part. The discontinuous belt of this slab is observed on the western margin of the state. Half of the districts belonged to low to very low index (90.5 - 15.5 composite rankings) form an identifiable discontinuous region in the eastern part of the state. Three Himalayan districts (Dehradun, Garhwal and Nainital) and one west plain district (Rampur) form a distinct region in the northern part.

MORTALITY AND INDEPENDENT VARIABLES

For causal analysis of the mortality (death rate and infant death rate) patterns of the population a correlation matrix of the variables has been prepared for total, rural and urban populations of each of the sixty-three districts of Uttar Pradesh. The hypothesis is proposed to test the probable determinants which significantly influence mortality in Uttar Pradesh. In this regard correlation coefficients are computed between determinants and mortality (death rate and infant death rate), and t-test is adopted to find out the determinants which are significant 95 per cent level of confidence.

Test of Simple Linear Correlation

The hypothesis proposed is to test the probable demographic and non-demographic variables which significantly and non-significantly influence human mortality in Uttar Pradesh. The null hypothesis formulated for total, rural and urban mortality rate that no significant degree of relationship is found with the determinants selected.

Relationship between Death Rate and Independent Variables

For the test of relationship between density of population (X_{01}), percentage of urbanization (X_{03}), female age at marriage (X_{09}), number of family welfare clinics per lakh population (X_{19}), per capita government expenditure in Rs. on health services (X_{20}), percentage of population growth (X_{21}), female literacy rate (X_{27}), percentage of female education upto high school and intermediate (X_{30}), percentage of female graduates and others (X_{31}) and birth rate (X_{38}) are significantly related with death rate (Y_{01} of the districts at 99 per cent and 95 per cent of confidence level. The coefficients of correlation is obtained to be positive and well above the confidence level of significant and thus the null hypothesis is rejected. This means that there is acceptable validity in the assumption that the districts with higher density of population, percentage of urbanization, female age at marriage, number of family welfare clinics per lakh population, per capita government expenditure in Rs. on health services, percentage of population growth, female literacy rate, percentage of female education upto high school and intermediate, percentage of female graduates and others, and birth rate have higher death rate (Y_{01}) and vice versa. Percentage of female education upto primary school (X_{28}), percentage of female married population in age group 20-24 (X_{33}), percentage of population in agricultural activity (X_{34}) and child-woman ratio (X_{39}) have inverse relationship with death rate (Y_{01}) and are significant at

5 per cent level. Even X_{28}, X_{33} and X_{39} are significant at 1 per cent level.

Among the variables used for rural population, the coefficients of correlation of per capita income at current prices (X_{10}), percentage of Christians population (X_{06}), child-woman ratio (X_{39}) and birth rate (X_{38}) are significantly correlated with rural death rate (Y_{01}). First three have negative correlation and well above the 95 per cent of confidence limit and last has positive correlation and well above the 99 per cent of confidence limit. About fifty-three per cent and thirty-seven per cent of the variables have respectively negative and positive correlation with rural death rate and found to be far below the significance level (Table 15).

Obviously, it may be pointed out that the regional variation in the rural mortality rate is mainly caused by income, religion and fertility differentials.

Fourteen variables are significant at confidence level of 99 per cent though the actual magnitudes of their coefficients with urban death rate (Y_{01}) are different. Total dependency ratio (X_{22}), juvenile dependency ratio (X_{23}), literacy rate (X_{26}), percentage of female education upto middle school (X_{29}), percentage of population in agricultural activity (X_{34}), percentage of female population

TABLE 15

RESULTS OF SIMPLE LINEAR CORRELATIONS (r) OF VARIABLES WITH MORTALITY (DEATH RATE) IN TOTAL, RURAL AND URBAN POPULATION, UTTAR PRADESH

Variable (See Table 02)	Death Rate (Y_{01}) Total	Rural	Urban
X_{01}	+0.262**	-0.030	+0.018
X_{02}	-0.023	-0.028	-0.016
X_{03}	+0.382*	-0.112	-0.142
X_{04}	-0.071	-0.116	+0.064
X_{05}	+0.070	+0.126	-0.060
X_{06}	+0.171	-0.244**	+0.050
X_{07}	+0.094	-0.156	+0.045
X_{08}	+0.004	-0.026	-0.039
X_{09}	+0.265**	-0.099	+0.003
X_{10}	-0.059	-0.384*	-0.060
X_{11}	-0.090	+0.139	-0.037
X_{12}	-0.017	+0.037	+0.046
X_{13}	-0.031	-0.175	-0.071
X_{14}	+0.006	-0.018	-0.045
X_{15}	+0.099	+0.003	-0.055
X_{16}	+0.160	-0.114	-0.011
X_{17}	-0.121	+0.117	-0.013
X_{18}	-0.172	+0.055	-0.006
X_{19}	+0.263**	-0.005	-0.130
X_{20}	+0.491*	-0.128	+0.147

TABLE 15 (Contd.)

X_{21}	$+0.250^{**}$	-0.125	-0.166
X_{22}	-0.077	$+0.153$	$+0.643^{*}$
X_{23}	-0.066	-0.034	$+0.793^{*}$
X_{24}	-0.082	$+0.164$	-0.476^{*}
X_{25}	-0.063	$+0.053$	-0.925^{*}
X_{26}	$+0.173$	-0.115	$+0.995^{*}$
X_{27}	$+0.243^{**}$	-0.093	$+0.243^{**}$
X_{28}	-0.342^{*}	$+0.111$	0.247^{**}
X_{29}	$+0.016$	-0.102	$+0.806^{*}$
X_{30}	$+0.321^{**}$	-0.136	-0.178
X_{31}	$+0.324^{**}$	$+0.103$	$+0.242^{**}$
X_{32}	-0.167	$+0.043$	-0.382^{*}
X_{33}	-0.397^{*}	-0.003	-0.644^{*}
X_{34}	-0.290^{**}	$+0.088$	$+0.657^{*}$
X_{35}	$+0.033$	-0.123	-0.608^{*}
X_{36}	-0.078	$+0.123$	$+0.515^{*}$
X_{37}	$+0.109$	-0.121	-0.473^{*}
X_{38}	$+0.717^{*}$	$+0.392^{*}$	$+0.736^{*}$
X_{39}	-0.737^{*}	-0.232^{**}	-0.810^{*}
X_{40}	Dependent Variable (Death Rate)		
X_{41}	-0.079	$+0.038$	-0.141

* Significant at 1 per cent level.

** Significant at 5 per cent level.

in agricultural activity (X_{36}) and birth rate (X_{38}) are found to have direct relationship with urban death rate (Y_{01}). Senile dependency ratio (X_{24}), sex ratio (X_{25}), percentage of female married population in age group 15-19 (X_{32}), percentage of female married population in age group 20-24 (X_{33}), percentage of population in non-agricultural activity (X_{35}), percentage of female population in non-agricultural activity (X_{37}) and child-woman ratio (X_{39}) have inverse relationship with death rate of urban population. These two sets of variables having high degree of relationship are significant at 1 per cent level. Three variables X_{27} (female literacy rate), X_{28} (percentage of female education upto primary school) and X_{31} (percentage of female graduates and others) have positive correlation with urban death rate (Y_{01}) and are significant at 5 per cent level.

Table 15 shows that the dependency ratio, female educational status, female employment in agriculture and birth rate are directly and significantly proportional to urban death rate which may generally be caused by the reporting of maximum number of deaths in urban areas as compared to rural.

Relationship between Infant Death Rate and Independent Variables

The testing of simple association between infant death rate (Y_{02}) and each of the individual variable (X) is shown in Table 16. The null hypothesis formulated is that infant death rate (Y_{02}) has no significant correlation, for example, with number of medical hospitals, dispensaries per lakh population (X_{14}) and birth rate (X_{38}). The t-test gives the value which goes well above the adopted level of significance at 1 per cent and 5 per cent respectively for infant death rate (Y_{02}). The null hypothesis is, therefore, rejected and the valid inference seems to be that these variables are significant determinants of infant death rate (Y_{02}) in the state. About forty-five per cent of the variables are found to have very low degree of negative relationship. Some of the selected variables of inverse relationship are X_{01}, X_{02}, X_{03}, X_{05}, X_{06}, X_{12}, X_{15}, X_{16}, X_{17}, X_{19}, X_{20}, X_{21}, X_{25}, X_{30}, X_{31}, X_{32}, X_{36} and X_{40} (Table 16).

Among the variables used for rural areas, the coefficients of correlation of six variables recorded have significant relationship with rural infant death rate (Y_{02}), and are significant at 95 per cent level of confidence. They are :

TABLE 16

RESULTS OF SIMPLE LINEAR CORRELATIONS (r) OF VARIABLES WITH MORTALITY (INFANT DEATH RATE) IN TOTAL, RURAL AND URBAN POPULATION, UTTAR PRADESH

Variable (See Table 02)	Infant Death Rate (Y_{02}) Total	Rural	Urban
X_{01}	-0.106	-0.082	+0.045
X_{02}	-0.035	-0.134	+0.022
X_{03}	-0.038	+0.006	+0.021
X_{04}	+0.181	+0.056	+0.196
X_{05}	-0.161	-0.038	-0.192
X_{06}	-0.151	-0.145	-0.081
X_{07}	+0.014	-0.037	-0.020
X_{08}	+0.140	+0.263**	+0.113
X_{09}	+0.165	+0.120	+0.041
X_{10}	+0.064	+0.089	+0.051
X_{11}	+0.135	+0.093	+0.044
X_{12}	-0.012	+0.007	-0.171
X_{13}	+0.184	+0.198	-0.089
X_{14}	-0.331*	-0.110	+0.113
X_{15}	-0.021	-0.100	+0.256**
X_{16}	-0.046	-0.072	+0.243**
X_{17}	-0.015	-0.094	+0.099
X_{18}	+0.037	-0.050	+0.072
X_{19}	-0.014	-0.339*	+0.017
X_{20}	-0.111	-0.114	+0.030

TABLE 16 (Contd.)

X_{21}	-0.094	-0.038	-0.085
X_{22}	+0.005	-0.123	-0.155
X_{23}	+0.004	+0.003	-0.159
X_{24}	+0.007	-0.155	-0.180
X_{25}	-0.172	-0.386*	+0.060
X_{26}	+0.084	-0.017	-0.118
X_{27}	+0.064	-0.054	+0.251**
X_{28}	+0.099	-0.014	-0.538*
X_{29}	+0.036	+0.183	-0.396*
X_{30}	-0.157	-0.123	-0.158
X_{31}	-0.136	+0.007	+0.365*
X_{32}	-0.074	-0.037	+0.063
X_{33}	+0.114	-0.079	+0.083
X_{34}	+0.008	+0.008	-0.261*
X_{35}	+0.010	+0.014	+0.264**
X_{36}	-0.196	-0.407*	-0.086
X_{37}	+0.188	+0.408*	+0.086
X_{38}	-0.312**	-0.265**	-0.176
X_{39}	+0.006	+0.037	+0.019
X_{40}	-0.079	+0.038	+0.141
X_{41}	Dependent Variable (Infant Death Rate)		

* Significant at 1 per cent level.

** Significant at 5 per cent level.

X_{19} (number of family welfare clinics per lakh population) = -0.339

X_{25} (sex ratio) = -0.386

X_{36} (percentage of female population in agricultural activity) = -0.407.

X_{37} (percentage of female population in non-agricultural activity) = +0.408

X_{08} (infra-structure facilities) = +0.263 and

X_{38} (birth rate) = -0.265.

First four are significant at 1 per cent level. About eighty-five per cent variables are found to have negative and positive correlation to be far below the confidence limit (Table 16). After test of simple linear correlation it has been found that medical facilities, female employment, infra-structure facilities and demographic profile are the chief factors which determine the rural infant death rate.

Percentage of female education upto primary school (X_{28}), percentage of female education upto middle school (X_{29}), percentage of female graduates and others (X_{31}), percentage of population in agricultural activity (X_{34}), percentage of population in non-agricultural activity (X_{35}), female literacy rate (X_{27}), number of doctors per lakh population (X_{16}) and number of hospital beds per lakh population (X_{15}) are significant at 5 per cent level. X_{28}, X_{29} and X_{31} are significant even at 1 per cent level. X_{28}, X_{29} and X_{34} are negatively correlated and X_{15}, X_{16}, X_{27}, X_{31} and X_{35} are positively correlated with urban infant death rate (Y_{02}). About eighty per cent variables have positive and negative relationship with urban infant death rate and found to be far below the significance level (Table 16). Some of the variables which are directly proportional to infant death rate in urban areas are X_{01}, X_{02}, X_{03}, X_{04}, X_{08}, X_{09}, X_{10}, X_{11}, X_{14}, X_{17}, X_{18}, X_{19}, X_{20}, X_{25}, X_{32}, X_{33}, X_{37}, X_{39} and X_{40}. Variables X_{05}, X_{06}, X_{07}, X_{12}, X_{13}, X_{21}, X_{22}, X_{23}, X_{24}, X_{26}, X_{30}, X_{36} and X_{38} are inversely proportional to infant death rate of urban population (Table 16).

The overall assessment of the variables and their relationship with infant death rate leads to the conclusion that the female education attainments, employment and medical facilities are the main determinants of infant death rate of the urban population in Uttar Pradesh.

Factor Analysis

The factor analysis shows that forty-one original variables selected for the analysis of both fertility and mortality could be collapsed to form five new independent variates for total, rural and urban areas.

Factor analysis leads to the identification of five factors by which the common variance of fertility and mortality of total population is explained upto an acumulative percentage of 68.16. Similarly for the rural and urban population also five factors are identified which explain the variance upto the cumulative percentage of 63.29 and 66.29 respectively (Table 20). It will be seen from the table that first four factors, i.e., F_{01}, F_{02}, F_{03} and F_{04} are of relatively very high significance in all the three areas of the population and as such they are given special importance and consideration in the typology although non of the computed results have been omitted from consideration.

Factor $_{01}$

Factor $_{01}$ which explains 28.00 per cent of the total variance comprises a large number of highly intercorrelated variables. These variables against their factor loadings are X_{27} female literacy rate (+0.92559), X_{26} literacy rate (+0.87990), X_{09} female age at marriage (+0.81463), X_{35} percentage of population in non-agricultural activity (+0.78509), X_{20} per capita government expenditure in Rs. on health services (+0.69979), X_{02} migration rate (+0.69408) and X_{03} percentage of urbanization (+0.68772). Some of the variables which have factor loading below 0.60 are X_{06} percentage of Christians population (+0.56481), X_{14} number of medical hospitals, dispensaries per lakh population

(+0.49407), X_{37} percentage of female population in non-agricultural activity (+0.46038), X_{30} percentage of female education upto high school and intermediate (+0.44836), X_{10} per capita income at current prices in Rs. (+0.43868), X_{19} number of family welfare clinics per lakh population (+0.39607). In contrast, negative loadings of high degree of more than 0.70 are found on:

X_{34} (percentage of population in agricultural activity) = -0.80071

X_{32} (percentage of female married population in age group 15-19) = -0.78576 and

X_{33} (percentage of female married population in age group 20-24) = -0.76883.

This factor may be named as socio-cultural factor.

Factor_{02}

This is the second most important factor explaining 19.23 per cent of the total variance. The rotated factor shows that the highest positive loading is on the variable number of mother and infant welfare centres per lakh population (+0.86701) which is followed by sex ratio (+0.81108), percentage of female education upto primary school (+0.69407) and number of medical hospitals, dispensaries per lakh population (+0.68990). In addition to these, number of child-care hospitals per lakh population

(+0.65893), percentage of female population in agricultural activity (+0.59733), percentage of Hindus population (+0.49266), number of hospital beds per lakh population (+0.44716) and percentage of population in agricultural activity (+0.44286) have also the high loadings. It, on the other hand, shows high and moderately high negative loadings on:

X_{21} (percentage of population growth) -0.71902,

X_{30} (percentage of female education upto high school and intermediate) -0.66025,

X_{29} (percentage of female education upto middle school) - 0.63298,

X_{37} (percentage of female population in non-agricultural activity) - 0.58229,

X_{01} (density of population) - 0.49480,

X_{05} (percentage of Muslims population) - 0.48955,

X_{12} (land productivity in quintals per hectare) - 0.47825,

X_{35} (percentage of population in non-agricultural activity) - 0.42408 and

X_{20} (per capita government expenditure in Rs. on health services) - 0.41489.

These variables may be combinedly termed as health facilities-cum-female education and employment factor.

Factor$_{03}$

Factor$_{03}$ is strongly related to the age structure, which represents the third most important dimension of variables accounts for 8.47 per cent of the total variance. It is characterized by high positive loadings of +0.95490, +0.92716 and +0.86147 respectively on juvenile dependency ratio (X_{23}), total dependency ratio (X_{22}) and senile dependency ratio (X_{24}). These loadings against their variables are followed by X_{15} number of hospital beds per lakh population (+0.75825), X_{16} number of doctors per lakh population (+0.75703), X_{10} per capita income at current prices in Rs. (+0.41332) and X_{14} number of medical hospitals, dispensaries per lakh population (+0.41211) (Table 17).

These variables may be combinedly known as age composition and health facilities factor.

Factor$_{04}$

Factor$_{04}$ explains 6.81 per cent of the total variance and it is heavily loaded on the variables death rate (+0.79842), birth rate (+0.76833), per capita government expenditure in Rs. on health services (+0.41107), percentage of female graduates and others (+0.40124), child-woman ratio (-0.68273) and infant death rate (-0.45844). It may be nominated as vital processes factor.

TABLE 17

FACTOR MATRIX FOR TOTAL POPULATION

Variable (See Table 02)	F_{01}	F_{02}	F_{03}	F_{04}	F_{05}
X_{01}	0.17649	-0.49480	-0.36906	0.18168	-0.19189
X_{02}	0.69408	0.32188	0.29330	-0.05392	0.10907
X_{03}	0.68772	-0.54260	-0.13511	0.20270	-0.12722
X_{04}	0.08715	0.49266	0.00762	-0.11755	0.75572
X_{05}	-0.14703	-0.48955	-0.02460	0.11885	-0.75377
X_{06}	0.56481	-0.14097	-0.02715	0.28392	-0.15301
X_{07}	-0.21716	-0.06729	0.05092	0.05459	0.62895
X_{08}	0.29511	0.20243	0.24572	-0.11361	0.31393
X_{09}	0.81463	-0.10051	0.07822	-0.05988	-0.15980
X_{10}	0.43868	-0.30596	0.41332	-0.25562	0.15658
X_{11}	-0.01355	-0.30419	-0.18353	-0.28295	-0.28021
X_{12}	0.19802	-0.47825	-0.11279	-0.18516	-0.60841
X_{13}	-0.03739	-0.34528	0.06842	-0.15574	0.55516
X_{14}	0.49409	0.68990	0.41211	0.02032	0.11812
X_{15}	0.24099	0.44716	0.75825	0.12789	0.11469
X_{16}	0.36797	0.30553	0.75703	0.17411	0.25887
X_{17}	-0.15673	0.65893	0.27222	0.05114	0.19343
X_{18}	0.06801	0.86701	0.28998	-0.12534	0.16302
X_{19}	0.39607	0.13683	0.04065	0.22721	0.03452

TABLE 17 (Contd.)

X_{20}	0.69979	-0.41489	-0.11795	0.41107	-0.01695
X_{21}	0.10041	-0.71902	0.10483	0.16657	0.11259
X_{22}	-0.12240	0.08762	0.92716	-0.02635	0.00095
X_{23}	-0.06369	0.07969	0.95490	-0.01754	0.04760
X_{24}	-0.16562	0.08773	0.86147	-0.03488	-0.04021
X_{25}	0.04741	0.81108	0.05246	0.12869	0.02876
X_{26}	0.87990	0.24876	-0.05943	0.03062	0.22293
X_{27}	0.92559	0.13274	-0.12706	0.09215	0.10230
X_{28}	-0.46443	0.69407	-0.08413	-0.27389	0.18701
X_{29}	-0.04527	-0.63298	-0.30265	-0.12917	0.05768
X_{30}	0.44836	-0.66025	0.14205	0.30212	-0.22338
X_{31}	0.34232	-0.25735	0.20259	0.40124	-0.26032
X_{32}	-0.78576	0.11219	0.09745	0.02315	0.39101
X_{33}	-0.76883	0.21964	-0.02639	-0.34409	0.23684
X_{34}	-0.80071	0.44286	0.11167	-0.15335	-0.01653
X_{35}	0.78509	-0.42408	-0.10593	-0.05465	-0.00929
X_{36}	-0.38405	0.59733	0.18551	0.19919	0.37749
X_{37}	0.46038	-0.58229	-0.17138	-0.21570	-0.36702
X_{38}	0.08586	0.01543	-0.08908	0.76833	-0.00477
X_{39}	-0.35132	-0.03390	-0.04220	-0.68273	-0.13626
X_{40}	0.18835	-0.14764	-0.03611	0.79842	0.07505
X_{41}	0.10384	-0.04866	-0.02385	-0.45844	0.19108

Factor$_{05}$

Factor$_{05}$ accounts for 5.65 per cent of the total variance and has the positive loading values of over 0.40 on X_{04} percentage of Hindus population (+0.75572), X_{07} percentage of Scheduled Castes and Scheduled Tribes population (+0.62895) and X_{13} net total output per worker in Rs. '000 (+0.55516). The variables of generally high negative loadings are percentage of Muslims population (X_{05}) and land productivity in quintals per hectare (X_{12}). This factor may be designated as cultural and economic factor.

From the above given outline of the factor analysis it may be concluded that the all factors which explain 68.16 per cent of the total variance are most significant determinants. They, in descending order, are:

F_{01} (Socio-cultural factor)

F_{02} (health facilities-cum-female education and employment factor)

F_{03} (age composition and health facilities factor)

F_{04} (vital processes factor) and

F_{05} (cultural and economic factor).

In factor analysis the pattern of relationships between the variables for rural and urban areas separately has also been examined and forty-one variables have reduced to five generalized factors. In fact, the analysis indicates that 63.29 per cent of the total variance for rural and 66.29 per cent for the urban areas may be explained by five variates. However, all five variates for rural and urban areas are found to be important for the analysis of fertility and mortality patterns in Uttar Pradesh.

For rural areas the five factors obtained through the analysis and their eigen values together with the per cent of total variance are set out in Table 20. This would indicate that the selected primary variables which have been collapsed into five factors do indeed form meaningful elements for the analysis of fertility and mortality of the rural population.

Factor_{01}

Factor_{01} accounts for 22.00 per cent of the total variance. It comprises a large number of highly positive intercorrelated variables. They against their factor loadings are X_{18} number of mother and infant welfare centres per lakh population (+0.81102), X_{36} percentage of female population in agricultural activity (+0.75807), X_{25} sex ratio (+0.75612), X_{14} number of medical hospitals, dispensaries per lakh population (+0.74871), X_{17} number of child-care hospitals per lakh population (+0.72509), X_{15} number of hospital beds per lakh population (+0.64570), X_{16} number of doctors per lakh population (+0.63155),

X_{04} percentage of Hindus population (+0.60254), X_{02} migration rate (+0.46374) and X_{08} infra-structure facilities (+0.39304). Negative factor loadings on variables are relatively low and they are relatively few in number having the value of -0.40. They are X_{01} (density of population - 0.58561), X_{03} (percentage of urbanization - 0.51436), X_{11} (per capita food-grain availability in Kg. - 0.44998), X_{12} (land productivity in quintals per hectare - 0.69017), X_{37} (percentage female population in non-agricultural activity - 0.75824) and X_{39} (child-woman ratio - 0.45209). This factor may be known as health facilities and rurality factor.

$Factor_{02}$

$Factor_{02}$ explains 18.97 per cent of the total variance and is very highly loaded on the variables X_{09} (+0.86903) female age at marriage, X_{02} (+0.69641) migration rate and X_{27} (+0.63240) female literacy rate. It is moderately loaded on the variables X_{35} (+0.58369) percentage of population in non-agricultural activity, X_{26} (+0.57131) literacy rate, X_{14} (+0.55661) number of medical hospitals, dispensaries per lakh population, X_{03} (+0.54165) percentage of urbanization, X_{20} (+0.51704) per capita government expenditure in Rs. on health services, X_{06} (+0.51094) percentage of Christians population, X_{10} (+0.50891) per capita income at current prices in Rs., X_{31} (+0.45634) percentage of female graduates and others and X_{16} (+0.45158) number of doctors per lakh population. This factor is also negatively loaded on X_{32} (-0.88212) percentage of female married population in age group 15-19 and X_{33} (-0.83502) percentage of female married population in age group 20-24. This factor may be called marital status and cultural factor.

Factor$_{03}$

Factor$_{03}$ accounts for 8.57 per cent of the total variance for rural population. It is positively loaded on X_{28} (+0.92840, percentage of female education upto primary school) and X_{34} (+0.44249, percentage of population in agricultural activity), and negatively loaded on X_{30} (-0.88565), X_{29} (-0.75101), X_{35} (-0.59997), X_{31} (-0.54272), X_{01} (-0.44234), X_{06} (-0.43795) and X_{20} (-0.42984) (Table 18). This factor may be designated as socio-cultural factor.

Factor$_{04}$

Factor$_{04}$ constitutes 6.90 per cent of the total variance. Five variables included in this factor are found to give relatively high factor loadings with the values ranging from 0.40 to 0.55. They are:

TABLE 18

FACTOR MATRIX FOR RURAL POPULATION

Variable (See Table 02)	F_{01}	F_{02}	F_{03}	F_{04}	F_{05}
X_{01}	-0.58561	-0.05748	-0.44234	-0.27175	0.23149
X_{02}	0.46374	0.69641	-0.24412	0.08909	0.10044
X_{03}	-0.51436	0.54165	-0.32610	0.05911	0.05106
X_{04}	0.60254	-0.17781	-0.08898	0.41320	0.57246
X_{05}	-0.62487	0.11191	0.09326	-0.43296	-0.53045
X_{06}	-0.02735	0.51094	-0.43795	-0.07992	-0.21471
X_{07}	0.20682	-0.29939	-0.00633	0.44520	-0.03423
X_{08}	0.39304	0.20632	-0.18282	0.31210	0.02805
X_{09}	-0.19427	0.86903	0.03264	0.15468	0.11402
X_{10}	-0.06131	0.50891	-0.02906	0.46877	-0.22701
X_{11}	-0.44998	-0.05598	0.01344	0.05587	0.01374
X_{12}	-0.69017	0.28663	-0.17194	-0.23780	-0.06813
X_{13}	0.03312	-0.14852	-0.27559	0.53469	-0.28712
X_{14}	0.74871	0.55661	0.05234	0.04951	0.14851
X_{15}	0.64570	0.37431	0.19164	0.20066	-0.01411
X_{16}	0.63155	0.45158	0.01850	0.28323	-0.05352
X_{17}	0.72509	-0.03553	0.37753	-0.03868	-0.04599
X_{18}	0.81102	0.17212	0.35984	0.04999	0.19902
X_{19}	0.09411	0.35382	-0.01622	-0.05333	0.22997

TABLE 18 (Contd.)

X_{20}	-0.32341	0.51704	-0.42984	0.04456	0.16358
X_{21}	-0.11466	-0.27677	-0.34887	0.15261	-0.62847
X_{22}	-0.12073	-0.24466	-0.13057	-0.53324	-0.55834
X_{23}	0.23594	0.02230	0.14919	0.02674	-0.83937
X_{24}	-0.36700	-0.37412	-0.20043	-0.64296	0.01169
X_{25}	0.75612	0.08930	-0.11031	-0.32353	0.24117
X_{26}	0.33350	0.57131	-0.22429	0.10439	0.59260
X_{27}	0.26752	0.63240	-0.23138	-0.01466	0.51220
X_{28}	0.04083	-0.10204	0.92840	-0.02524	-0.01264
X_{29}	-0.07965	-0.01845	-0.75101	0.17212	0.24538
X_{30}	-0.00945	0.09192	-0.88565	-0.10261	-0.15187
X_{31}	0.02600	0.45634	-0.54272	0.03987	-0.09685
X_{32}	0.14883	-0.88212	-0.03236	0.06574	-0.03813
X_{33}	-0.16334	-0.83502	0.17908	0.08585	0.04233
X_{34}	0.07454	-0.40869	0.44249	-0.08381	-0.12211
X_{35}	-0.00062	0.58369	-0.59997	0.08821	0.11691
X_{36}	0.75807	-0.32723	-0.11238	-0.10813	0.04354
X_{37}	-0.75824	0.32818	0.11493	0.10966	-0.04353
X_{38}	-0.01158	-0.02436	-0.00236	-0.55938	-0.16120
X_{39}	-0.45209	0.01136	0.09262	0.13434	-0.47653
X_{40}	0.05593	-0.06159	0.14216	-0.43242	0.06879
X_{41}	-0.26414	-0.02476	0.11873	0.48450	0.06409

X_{04} (percentage of Hindus population) = +0.41320

X_{07} (percentage of Scheduled Castes and Scheduled Tribes population) = +0.44520

X_{10} (per capita income at current prices in Rs.) = +0.46877

X_{13} (value of net total output per worker in Rs.'000) = + 0.53469 and

X_{41} (infant death rate) = +0.48450

The remaining four variables under this factor have negative loadings ranging from -0.40 to -0.65. They are:

X_{05} (percentage of Muslims population) = -0.43296

X_{24} (senile dependency ratio) = -0.64296

X_{38} (birth rate) = -0.55938 and

X_{40} (death rate) = -0.43242.

This factor may be termed as vital processes-cum-cultural factor.

Factor$_{05}$

Factor$_{05}$, explaining 6.85 per cent of the total variance, includes eight variables of high factor loadings of $\pm$ 0.40 and over. They are :

X_{04} (percentage of Hindus population)

X_{26} (literacy rate)

X_{27} (female literacy rate)

X_{05} (percentage of Muslims population)

X_{21} (percentage of population growth)

X_{22} (total dependency ratio)

X_{23} (juvenile dependency ratio) and

X_{39} (child-woman ratio).

Only the first three are positively loaded whereas all the remaining five are negatively loaded. This factor may be identified as educational and demographic factor.

It will be seen that the factor analysis of the fertility and mortality of rural population has yielded five significant factors which combinedly explain 63.29 per cent of the total variance. Arranged in descending order these factors run as:

F_{01} (health facilities and rurality factor)

F_{02} (marital status and cultural factor)

F_{03} (socio-cultural factor)

F_{04} (vital processes-cum-cultural factor) and

F_{05} (educational and demographic factor).

Forty-one variables as mentioned earlier could be collapsed to form five compound variates for factor analysis of fertility and mortality of urban population. These five factors explain 66.29 per cent of the variance (Table 20).

$Factor_{01}$

$Factor_{01}$ comprises a large number of highly inter-correlated variables of which few have very high loadings of more than 0.60 either positive or negative sign. In descending order of loadings, they are:

X_{25} (sex ratio) positive

X_{39} (child-woman ratio) positive

X_{35} (percentage of population in non-agricultural activity) positive

X_{33} (percentage of female married population in age group 20-24) positive

X_{40} (death rate) negative

X_{26} (literacy rate) negative

X_{23} (juvenile dependency ratio) negative and

X_{22} (total dependency ratio) negative.

The rest of variables which have their positive loadings between 0.40 and 0.60 are:

X_{37} (percentage of female population in non-agricultural activity) and

X_{24} (senile dependency ratio).

This factor may be recognized as population structure factor.

$Factor_{02}$

$Factor_{02}$ explains 18.20 per cent of the total variance and it is strongly loaded on the variables:

X_{01} (density of population)

X_{03} (percentage of urbanization)

X_{12} (land productivity in quintals per hectare)

X_{20} (per capita government expenditure in Rs. on health services)

X_{37} (percentage of female population in non-agricultural activity)

X_{14} (number of medical hospitals, dispensaries per lakh population)

X_{15} (number of hospital beds per lakh population)

X_{16} (number of doctors per lakh population)

X_{17} (number of child-care hospitals per lakh population)

X_{18} (number of mother and infant welfare centres per lakh population) and

X_{36} (percentage of female population in agricultural activity).

All these variables except first five, have negative loadings on the factor. In broad sense, the factor may be recognized as health facilities factor.

Factor$_{03}$

Factor$_{03}$ is accounted for 14.70 per cent of the total variance. This factor has relatively high positive loadings, ranging from 0.40 to 0.80, on

X_{02} (migration rate)

X_{03} (percentage of urbanization)

X_{06} (percentage of Christians population)

X_{09} (female age at marriage)

X_{14} (number of medical, hospitals, dispensaries per lakh population)

X_{19} (number of family welfare clinics per lakh population)

X_{20} (per capita government expenditure in Rs. on health services)

X_{27} (female literacy rate)

X_{30} (percentage of female education upto high school and intermediate) and

X_{35} (percentage of population in non-agricultural activity).

Rest of four variables which have their negative loadings between 0.40 and 0.70, are:

X_{24} (senile dependency ratio)

X_{32} (percentage of female married population in age group 15-19)

X_{33} (percentage of female married population in age group 20-24) and

X_{34} (percentage of population in agricultural activity).

This factor may be called as education and marital status factor.

Factor$_{04}$

Factor$_{04}$ possesses an explanatory less capacity as it accounts for 6.25 per cent. It includes eight variables - three variables of high degree of positive loadings and the remaining five variables of high degree of negative loadings (Table 19). They are:

X_{28} (percentage of female education upto primary school) positive

X_{29} (percentage of female education upto middle school) positive

X_{30} (percentage of female education upto high school and intermediate) positive

X_{10} (per capita income at current prices in Rs.) negative

X_{15} (number of hospital beds per lakh population) negative

X_{16} (number of doctors per lakh population) negative

TABLE 19

FACTOR MATRIX FOR URBAN POPULATION

Variable (See Table 02)	F_{01}	F_{02}	F_{03}	F_{04}	F_{05}
X_{01}	-0.05200	0.77016	0.02460	-0.13714	-0.13714
X_{02}	0.01777	-0.30397	0.67133	0.12535	0.12535
X_{03}	0.14078	0.63218	0.55218	-0.18802	-0.18802
X_{04}	-0.06168	-0.23683	-0.00609	0.87002	0.87002
X_{05}	0.05725	0.26157	-0.05267	-0.84855	-0.84855
X_{06}	-0.05360	0.16091	0.62356	-0.15615	-0.15615
X_{07}	-0.02611	0.04714	-0.24058	0.46086	0.46086
X_{08}	0.05734	-0.21843	0.26758	0.32225	0.32225
X_{09}	0.01939	0.07046	0.77098	-0.20893	-0.20893
X_{10}	0.11136	0.04235	0.29236	-0.12899	-0.12899
X_{11}	0.05235	0.23420	-0.07869	-0.39786	-0.39786
X_{12}	-0.05001	0.41196	0.15374	-0.72292	-0.72292
X_{13}	0.09546	0.21893	-0.12205	0.30369	0.30369
X_{14}	0.05235	-0.62517	0.58352	0.31079	0.31079
X_{15}	0.06520	-0.54205	0.27987	0.21488	0.21488
X_{16}	0.02000	-0.41280	0.36621	0.27256	0.27256
X_{17}	0.01473	-0.72658	-0.06117	0.31498	0.31498
X_{18}	0.02463	-0.85298	0.17956	0.35358	0.35358
X_{19}	0.13349	-0.01626	0.40019	0.13375	0.13375

TABLE 19 (Contd.)

X_{20}	-0.17423	0.59164	0.62148	-0.02889	-0.02889
X_{21}	0.13162	0.31688	0.06447	0.06268	0.06268
X_{22}	-0.64681	0.05889	-0.04378	-0.18886	-0.18886
X_{23}	-0.76301	-0.02910	-0.09315	-0.01554	-0.01554
X_{24}	0.47067	0.04168	-0.49404	-0.48426	-0.48426
X_{25}	0.91346	0.15306	-0.17853	-0.13969	-0.13969
X_{26}	-0.98004	-0.01724	0.06362	0.04355	0.04355
X_{27}	-0.20589	-0.19655	0.61953	0.55865	0.55865
X_{28}	-0.20628	-0.15532	-0.29335	-0.28567	-0.28567
X_{29}	-0.78832	0.08823	-0.00129	0.06667	0.06667
X_{30}	0.17487	0.24294	0.45862	0.07081	0.07081
X_{31}	-0.25114	-0.05243	0.12030	0.02377	0.02377
X_{32}	0.37264	-0.02544	-0.69537	0.39741	0.39741
X_{33}	0.63631	-0.00685	-0.60955	0.15022	0.15022
X_{34}	-0.72445	-0.18939	-0.42794	-0.25940	-0.25940
X_{35}	0.67884	0.20673	0.45396	0.26733	0.26733
X_{36}	-0.58146	-0.46042	-0.34943	0.06750	0.06750
X_{37}	0.54321	0.47427	0.36973	-0.07624	-0.07624
X_{38}	-0.75875	0.15875	0.11987	0.17262	0.17262
X_{39}	0.82516	0.03324	-0.35636	-0.25643	-0.25643
X_{40}	-0.98317	-0.00043	0.02661	0.01375	0.01375
X_{41}	0.16874	0.13157	-0.00909	0.24106	0.24106

TABLE 20

FACTOR STRUCTURE OF VARIABLES SELECTED FOR THE ANALYSIS OF FERTILITY AND MORTALITY PATTERNS IN UTTAR PRADESH

Factor	Eigen Value			COMMON VARIANCE EXPLAINED BY FACTOR					
				Per Cent Explained			Cumulation Per Cent Explained		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
F_{01}	11.47903	8.89593	8.85985	28.00	22.00	22.00	28.00	22.00	22.00
F_{02}	7.88404	7.77643	7.46095	19.23	18.97	18.20	47.23	40.97	40.20
F_{03}	3.47398	3.51389	6.02610	8.47	8.57	14.70	55.70	49.54	54.90
F_{04}	2.79303	2.82954	2.56133	6.81	6.90	6.25	62.51	56.44	61.15
F_{05}	2.31675	2.80744	2.10749	5.65	6.85	5.14	68.16	63.29	66.29

X_{31} (percentage of female graduates and others) negative and

X_{41} (infant death rate) negative

This factor may be known as levels of female education factor.

Factor$_{05}$

Factor$_{05}$ explaining 5.14 per cent of the total variance comprises three variables of positive loadings of more than 0.400 constant value. They are X_{04} (percentage of Hindus population), X_{07} (percentage of Scheduled Castes and Scheduled Tribes population) and X_{27} (female literacy rate). Remaining three variables of negative loadings of also more than 0.500 are :

X_{05} (percentage of Muslims population)

X_{24} (senile dependency ratio) and

X_{12} (land productivity in quintals per hectare).

This factor may be combinedly called cultural factor.

From the above given outline of the factor analysis it may be concluded that all five factors identified as the determinants of both fertility and mortality patterns of urban population, in descending order are:

F_{01} (population structures factor)

F_{02} (health facilities factor)

F_{03} (education and marital status factor)

F_{04} (levels of female education factor) and

F_{05} (cultural factor).

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CONCLUSION

Population growth in Uttar Pradesh has been increasing more than the country average for the last two decades. It has shown marked fluctuations since 1901. The population growth rate of the state shows the declining trend. The current rate (25.41 per cent) in the state is 1.85 per cent in points higher than that of the country (23.56 per cent). This rate decreased by 0.08 per cent point during 1981-91. It is surprising that the growth rate is declining in the country as well as the state. This fact indicates that the performance of family welfare programme is observed to be satisfactory.

Growth of rural/urban population in Uttar Pradesh showed similar trends of fluctuations to that of general trends since 1901. It may be pointed out that the rural economy must have undergone structural change and non-agricultural sector must be so expanded and diversified that it became an important source of employment to extra workers in the villages. The differences in the rural/urban population growth in the state be attributed to the physical factors, on one hand and the facilities extended to the people in respective districts in the rural and urban areas on the other.

It may be noted that general and rural distribution of population growth was high in southwestern and western districts and low in almost all the districts of eastern half of the state during 1951-61. In 1961-71, high growth of general population was observed in the districts of northwestern and southwestern parts, whereas it was low in almost all the districts of the eastern part of the state. Similar pattern was observed for rural population growth. This may be attributed to the lack of development and out-migration from these areas. During 1971-81, high population growth is noted in most of the southeastern districts and the northeastern districts of mainly the west plain, and low in the southwestern half of the state. The large variations in growth rates of population may be generally caused by interdistrict migration. During 1981-91, general and rural population growth was similarly distributed all over the state. High population growth was recorded in northwestern and southeastern districts while it was found to be low in the most of the Himalayan districts and central plain districts of the state. The high growth of population was mainly due to in-migration resulting from the development of manufacturing industries, mining, trade etc., all accelerate the process of the development. Districts showing low rate of population growth were associated with the low degree of urbanization and industrialization, with the decline in birth rate and out-migration caused by pressure of population. Generally, high growth of rural population were found in those areas which were agriculturally more productive.

The areas of relatively high literacy recorded low growth rate, suggesting strong association between population growth and levels of education. Similarly, the growth rate was low in those areas where performance of family welfare programme was satisfactory. No doubt, high growth of population was a negative symptom for the development, specially in developing countries, where resource exploitation was much lower as compared to the population growth.

The general birth rates in Uttar Pradesh and India were observed to be declined since 1961. In general there was ~~an~~ increasingly declining trends of birth rate in both rural and urban areas. The birth rate in urban areas was comparatively higher than the rural areas throughout the period of the study. This may be caused by illiteracy, low infrastructural facilities and backwardness in the rural areas. These aided the people not to get the births registered in rural areas.

The study reveals that the downward trends of child-women ratio was observed in the state since 1961, but these declining trends were not steady all through. In fact the periods of four decadal years had two distinct phase in the state. The first was the phase of steady increase and second was the phase of steady decline. But it tended to decline continuously in India as a whole since 1961. The ratio was fairly lower as compared to the state average. The declining rate of child-women ratio was sharp in rural population as compared to the urban population, it may be attributed to rural development and family welfare programme in the state.

In 1961, very high grade of birth rate in general and rural population covered about equal number of districts in the state, hence depicted similar patterns of birth rate in both general and rural population but urban birth rate did not depict uniform pattern.

It may be observed that in 1971 there was no uniform pattern of distribution which could aid to identify prominent region of any grade of birth rate for general, rural and urban population.

In 1981, the general and rural birth rates were distributed uniformly almost in all the districts of the state. The overall distribution of birth rate in urban population did not depict uniform pattern.

The overall analysis of fertility depicts that forty-eight per cent of districts have general birth rate more than the state average in the year of 1991. This pattern also reports that very high birth rate is found in the urban areas. The urban birth rate has the range of variations doubled to rural birth rate. It is recorded in the overwhelming majority of the districts of the central and eastern parts of the state. But forty-eight per cent of the districts have rural birth rate more than the state average. The range of variations in the rural birth rate is found to be relatively lesser. The interdistrict distribution of birth rate of both rural and urban population is distinctly uneven all over the state. It may be concluded that since 1961, the birth rates - general, rural and urban, were declined from northwestern to eastern part of the state.

The overall patterns of regional distribution of fertility (child-woman ratio) in Uttar Pradesh during four decadal years (1961-91) depict that in almost all areas, child-woman ratios are substantially high in rural population as compared to urban population, due to relatively more poverty stricken in rural population. The regional patterns of child-woman ratio depicts that it decreases sharply from west, and gradually from south and east districts to central districts of the state. Almost all the Himalayan districts are at the bottom slab of child-woman ratio because of high literacy rate. Female educational level in Himalayan region is also observed to be higher than the other parts of the state.

The analysis of the relationship between fertility (birth rate) and demographic and non-demographic variables highlights that the percentage of urbanization, percentage of Christians population, medical facilities and death rate bear a significant positive correlation with the general birth rate, and marital status, child-woman ratio and infant death rate bear a significant negative correlation with the general birth rate. The regional variation in the rural birth rate is caused negatively by the percentage of Scheduled Castes and Scheduled Tribes population, medical facilities and infant death rate, whereas dependency ratio and death rate are directly proportional to rural birth rate. Urban birth rate is significantly influenced by positive variables - density of population, per capita government expenditure in Rs. on health services, dependency ratio (total and juvenile), educational attainments, percentage of population in agricultural activity, percentage of female population in agricultural activity and death rate, and negative variables - senile dependency, sex ratio, percentage of female married population in age groups of 15-19 and 20-24 years, percentage of population in non-agricultural activity, percentage of female population in non-agricultural activity and child-woman ratio.

The tests signify that with increase in rate of urbanization, female age at marriage, medical facilities, educational attainments and birth rate there is a decline in child-woman ratio of the general population. On the other hand, percentage of female married population in age groups of 15-19 and 20-24 years and percentage of population in agricultural activity are found to bear a positive correlations with general child-woman ratio. Higher the migration rate, percentage of Hindus population, number of medical hospitals, dispensaries per lakh population, number of doctors per lakh population, literacy rate (person and female), percentage of female population in agricultural activity and death rate lower is the child-woman ratio in both the rural and urban population.

The trends of mortality rates in Uttar Pradesh and India were also observed to be almost the same as compared to fertility and to have been declined since 1961. The decline in the general death rates since then had been due to better availability of food grains in times of scarcity and the progress made in medicine and public health in combating diseases. There was an increasingly declining trends of death rates in both rural and urban populations. The death rate in rural population was comparatively lower than the urban population since 1961. The main cause for the lower death rate in rural population may be attributed to the younger age structure and moreover, low levels of literacy rate and low standard of living in rural population, the people did not get their deaths registered which ultimately lead to low death rate. Obviously, the period of the study had a single phase of declining death rate.

The infant death rate tremendously declined in the state and the country since 1961 but it was relatively high in India as a whole. It may be observed that infant death rate was already falling being influenced by improving socio-economic conditions and better medical services. Generally, infant death rates by residence continuously declined in the state and the country caused mainly by the development in medical facilities.

The interdistrict general and rural distribution of death rates in 1961 was almost similar. The general and rural high death rate and low death rate were found in more than half of the northwestern and eastern districts of the state respectively. It may be concluded that eastern districts appear to have a lower death rate which may be a fact or may be due to greater extent of under-registration in those areas. The urban death rate is uneven distributed over the state.

In 1971, general death rate varied from 1.10 to 11.10 per mille mid-year population. This range of variations was narrower than that of the year 1961. The high death rate in the Himalayan districts and west plain districts, and low death rate in almost all the southeastern districts was identified. The range of variation of death rates in the rural population was slightly lesser than that of the urban. With few exceptions, the pattern of death rates in the rural population is similar to the general population.

The general and rural death rates in 1981 had similar pattern of distribution. Very high and very low general death rates were found in the Himalayan zone. West plain and plateau districts were also lay under very low slab of death rates. Very high rural death rates were found in the Himalayan districts and west plain districts, whereas very high urban death rates were concentrated in the central and eastern districts of the state. In overall patterns of distribution of death rate in 1981, it was observed that there was lower death rates in rural population than the urban population.

During 1991, very high general death rates were found in the northern part of the plains, low in west and east plains. The range of variations was considerably narrower (0.02 to 6.44 per mille) in the rural population whereas it was much wider (0.51 to 11.76 per mille) in the urban population. The interdistrict distribution of death rate of rural and urban populations was distinctly uneven all over the state. Comparatively lower death rate in rural population may be due to better registration systems in the urban population.

In 1961, general infant death rate was found to be high in southcentral part and low in almost all the districts of eastern part of the state. The distributional patterns of rural and urban infant death rates were quite different. But distribution of rural infant death rate was almost similar to the general distribution. However, it had slightly wide range of variation with most of the districts in same region and the state average was slightly higher (0.63 point) as compared to infant death rate in total population. The state average of urban infant death rate was relatively high, which may be done to relatively proper registration in the urban areas.

The pattern of regional distribution of infant death rates in 1971 was observed to be lower than the previous year 1961. The districts showing high general infant death rates were mainly confined to western and central part of the state, whereas low infant death rates were found in the southern and eastern parts of the state. The infant death rates by residence also tended to decline from 1961 to 1971 and the rate of decline was almost similar to the general infant death rate. The rural high infant death rate was distributed in most of the districts of the Ganga-Yamuna doab and low in the districts of the plateau and east plain. It is notable that in urban population about twenty-six per cent of the districts had infant death rates above the state average. It identifies that very sharp interdistrict variations in urban infant death rates were found at the higher side of the scale in the southwestern districts of the state and low in the districts of central, eastern and plateau regions.

During 1980, there was a continuous decline in infant death rates in the districts. It marked with relatively narrow but notable variations among the districts and varied from 01 in Ghazipur to 48 in Varanasi. High general infant death rates were observed in the districts of central part, and low in northwestern districts, plateau districts and eastern districts of the state. The rural infant death rate was similar to general distribution of infant death rate. Most of the districts of central part lay under high rural infant death rate and eastern and northwestern districts accounted for low rural infant death rate. High urban infant death rate was identified regions in west, southwestern and eastern districts of the state. The districts of low urban infant death rates did not delimit a distinct region in the state.

The infant death rates tended to decline further but the rate of decline was low from 1980 to 1990 with a deviation of 3.05 points. The majority of the districts of central and west plains and the Himalayan zone had the high general infant death rates and majority of the districts of more than half of the southwestern and eastern parts of the state had the low infant death rate. Almost all the districts of the central western part of the state obtained the high rural infant death rate, most of the districts of southwestern and northeastern parts of the state lay under low rural infant death rates. The non ~~un~~uniform pattern of distribution of infant death rates was observed in the urban population of the districts in 1990. High infant death rate was found in the districts of Ganga-Yamuna doab and low in the northern districts of the west plain. A significant point to note is that the infant death rates in urban areas of the districts was generally lower than the rural areas, but in this study, there was an inverse shape of the distribution in rural and urban areas, because the study was based upon the registered data.

The mortality (death rate and infant death rate) variations and their relationships with forty independent variables have been tested which are expected to be the determinants of mortality differentials. The overall assessment of these variables and their associations with death rate leads to the conclusion that the female educational status, medical facilities and demographic profile are the chief determinants of death rate of the general population. But regional variations in death rate of the rural population are mainly caused by income, religion and fertility differentiates. Dependency ratio, female educational status, female employment in agriculture and birth rate are the main variables which are significantly proportional to death rate of urban population.

The tests signify that higher the rates of medical facilities and birth rate lesser is in infant death rate of general population. It may be concluded that medical facilities, female employment, infra-structure facilities and demographic profiles are the significant determinants of infant death rate of rural population, while in descending order of the importance educational attainments, employment and medical facilities are the main determinants of infant death rate of the urban population.

It has been observed that the variables of urbanization, medical facilities are directly proportional, and marital status and child-woman ratio are inversely proportional to fertility (birth rate) and mortality (death rate) of general population. Dependency ratio, educational status and agricultural employment record positively significant degree of relationship, whereas sex ratio marital status and non agricultural employment are inversely and significantly correlated with both birth rate and death rate of urban population.

Twenty-eight per cent variables are significantly correlated with both fertility (child-woman ratio) and mortality (death rate) of the general population, and thirty-eight per cent variables are significantly (positive and negative) correlated with urban child-woman ratio and death rate.

Clearly, higher the medical facilities and birth rate lesser is the child-woman ratio and infant death rate of general population, while higher the sex ratio and female agricultural employment lesser is the child-woman ratio and infant death rate of rural population. About eighteen per cent variables have either positive and negative correlation with fertility (child-woman ratio) and mortality (infant death rate) of the urban population.

The analysis of selected independent variables of the 41 x 63 data matrix collapsed into five new factors reveals that four factors which explain more than sixty per cent of the total variance are socio-cultural, health facilities-cum-female education and employment, age composition and health facilities, and vital processes. These are the prominent factors which influence regional patterns of fertility and mortality of the total population. For the rural population, the analysis has yielded all five factors in order of significance. They are health facilities and rurality, marital status and cultural, socio-cultural, vital processes-cum-cultural, and educational and demographic, which explain more than sixty per cent of the total variance. But for the urban population, the four significant determinants, in descending order of significance, are population structures, health facilities, education and marital status, and levels of female education.

Thus the analysis of fertility and mortality patterns of population is of paramount importance to researchers, planners involves in public health programme to take policy decision in relation to the levels and variations in fertility and mortality. It is an instrument to measure the growth of population, to look into the probable change in population compositions and to make population projection of the region.

Data available are not too much reliable as the sharp variations are observed in the contiguous districts therefore such study could be better if the small area is selected and the information is collected intensively at various levels through field survey.

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